

# ROCKS and MINERALS

PUBLISHED  
MONTHLY



Edited and Published by  
PETER ZODAC

APRIL  
1948

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ROCKS and MINERALS

PEEKSKILL, N. Y., U. S. A.

The official Journal of the Rocks and Minerals Association

# CHIPS FROM THE QUARRY

## COMING EVENTS

Annual Mineral Show  
State Mineral Society of Texas  
April 17-18, 1948  
Driskill Hotel, Austin, Texas  
(J. J. Brown, Pres., 302 Walton Bldg.,  
Austin 11, Texas.)

11th Annual Gem & Mineral Exhibit  
May 1-2, 1948  
Masonic Temple, 471 W. 41st Pl.,  
Los Angeles, Calif.  
Exhibit will be held by the Southwest  
Mineralogists, Inc. Everyone invited, Ad-  
mission free.  
(Walter S. Shirey, Show Chairman, 6251/  
W. 85th St., Los Angeles 44, Calif.)

1st National Convention  
American Federation of Mineralogical  
Societies  
June 13-16, 1948  
Denver, Colo.  
(Richard M. Pearl, Convention Chairman,  
Colorado College, Colorado Springs,  
Colo.)

9th Annual Convention  
California Federation of Mineralogical  
Societies

July 16-18, 1948  
Municipal Auditorium  
Long Beach, Calif.  
(Convention Chairman, 1850 E. Pacific  
Coast Highway, Long Beach 6, Calif.)

International Geological Congress  
18th Session—Great Britain, 1948  
Aug. 25-Sept. 1, 1948  
(A. J. Butler, Gen. Sec. Geological Sur-  
vey and Museum, Exhibition Road, Lon-  
don, S. W. 7, England)

Some 1,100 geologists from countries  
overseas plus British geologists will swell  
the attendance to over 2,000. Twenty-  
eight Governments and about 160 uni-  
versities and scientific institutions will be  
represented at this, the world's greatest  
geological congress which meets every two  
years and each time in a different country.  
Field trips to many geological and min-  
eralogical localities are on the program.

Northwest Federation Convention  
Sept. 4-5, 1948  
Bozeman, Mont.  
(H. E. Murdock, Vice-President, Boze-  
man, Mont.)

## ATTENTION MINERAL DEALERS

The California Federation of Mineral Societies at its last meeting voted to edit a directory of names and addresses of its members. The total membership probably will exceed 2500 in its forty-two member societies. The North-west Federation has published such a directory for a number of years. This directory should be an excellent advertising medium.

The directory will exceed \$500 in cost and we need your support in the form of advertisements. Tentative rates follow:

Full page—one column by six inches	\$20.00
Half page—one column by three inches	\$12.50
Quarter page—one column by one and one-half inches	\$ 7.00
Outside back cover one column by six inches	\$30.00
Inside back cover—one column by six inches	\$25.00

All those interested please notify me as soon as possible stating space desired.

**CARL A. NOREN**

ROUTE 3, BOX 312

FRESNO, CALIFORNIA

# ROCKS and MINERALS

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## THE CAMELBACK CAVES

By RONALD L. IVES

Vice-President, Rocks and Minerals Association

### ABSTRACT

Field studies of the Camelback Caves, a honeycombed limestone mountain area in Tooele County, Utah, initiated in search for remains of ancient man, are here reported, their origin and history outlined, and an explanation of the lack of fossil remains attempted.

### INTRODUCTION

During the summer of 1942, while engaged in field reconnaissances in the Utah desert, the writer found a series of medium-sized limestone caves on a western outlier of Camelback Mountain.

Location of this mountain is shown in Fig. 1, and its general appearance is shown in Fig. 2. *This area may not be visited by any except military personnel acting under official orders.*

Finding of a large number of relatively ancient artifacts, pottery shards, and several kitchen middens in the area suggested that the ancient caves might be worth investigating for possible evidence of either ancient man or extinct pleistocene mammalian remains, or both.

Although this search was fruitless,

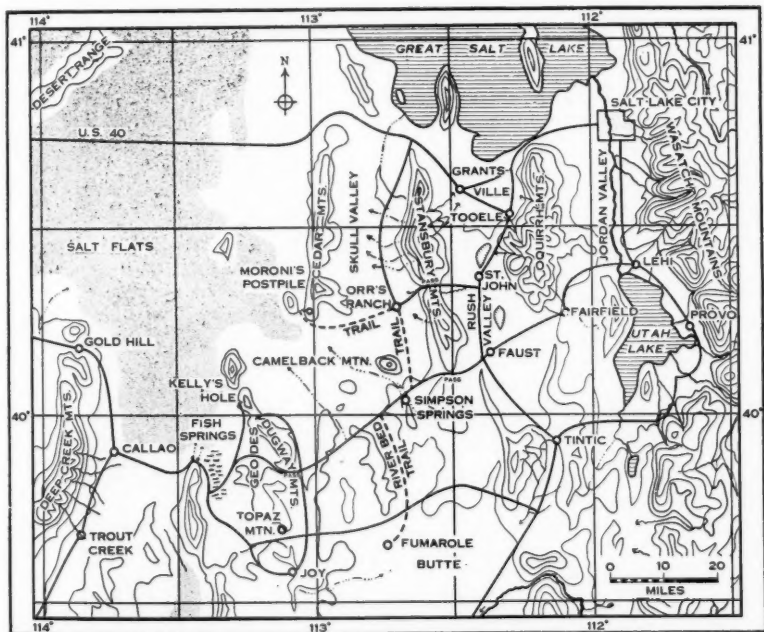


Fig. 1. Outline map of the Utah desert area, showing location of principal points of geologic interest and access roads available to the general public. Contour interval is about 1,000 feet, lowest contour is 5,000 feet. The area surrounding Camelback Mountain is permanently closed to entry to all except military personnel on official orders.

much information of geologic interest was collected, of which the major portion will be presented here.

#### GEOLOGIC ENVIRONMENT

The Camelback Caves are located near the top of a narrow ridge of partially metamorphosed limestone, to which an early paleozoic age has been assigned because of the presence of poorly preserved trilobites, corals, and "worms" (probably filled cavities produced by the decay of plant stems). Large jasper inclusions, similar in distribution, and probably similar in origin, to the flints in the Dover chalk cliffs, are common throughout the whole formation.

The limestone dips to the west southwest at an angle of about  $20^\circ$ , has been faulted repeatedly during several stages of diastrophism, and the older faults and joints are filled with ferruginous silica. Newer faults, cracks, and joints, as well as undistorted bedding planes, are not filled.

Distributed widely at all levels on this ridge are calcareous tufa, of late Pleistocene age (deposited at low stages of Lake Bonneville), and various gravel and sand deposits, some calcified, of similar age and origin. Care should be taken not to misdate the limestone because of the presence of recent gastropod shells in some calcified talus deposits on adjacent mountain slopes.

General appearance of the ridge is shown in Fig. 3, a view taken from the northwest.

#### THE CAVES

##### General Description

There are four major caves in this ridge at present, with ample evidence, in the form of flowstone pillars and "veils", that several rooms have collapsed in the not too distant past. A sketch map of the caves comprises Fig. 4.

##### ENTRANCES

All of the caves have horizontal entrances, into which a man can walk without stooping. The caves are much larger inside the entrance than at the entrance, in part due to the original profile, and in part to blocking of the entrance by fallen roof blocks. The entrance to Cave No. 4 is shown in Fig. 5.

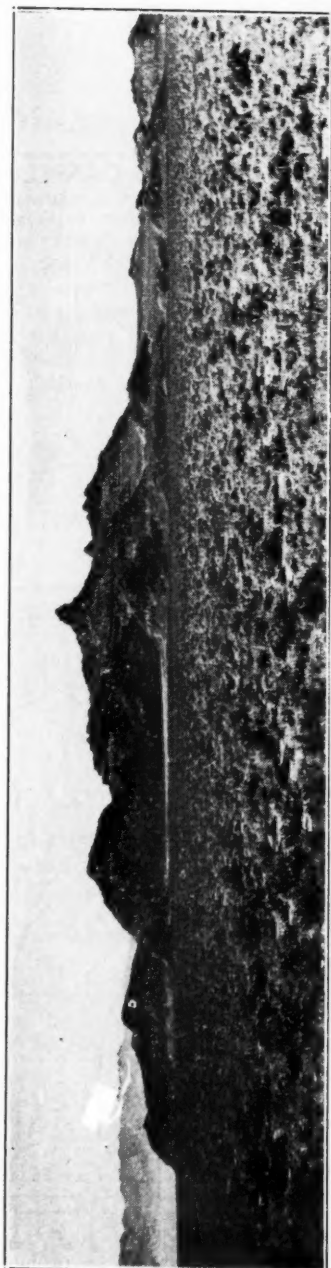


Fig. 2. Camelback Mountain, as seen from the northwest. The caves are located in the outlier to the right of the main mountain. Note the Provo shoreline half way up the mountain, and the Stensbury shoreline below it.



the main gin, and the Stensbury shoreline below it.

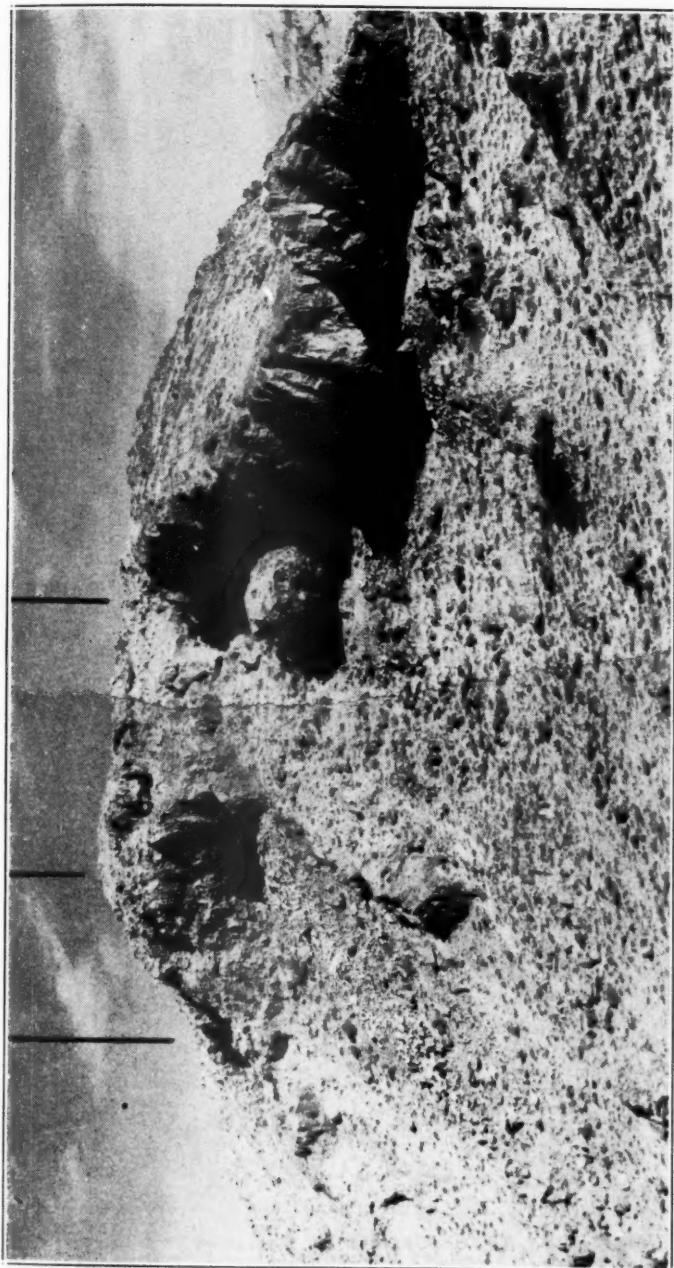


Fig. 3. View of the ridge containing the caves, as seen from the northwest. Cave entrances are below ruled lines.

In addition to a normal horizontal entrance, Cave No. 1 has a chimney in the top, through which an agile man can enter or leave. This chimney (Fig. 6) is believed due to solution, as there is no pile of debris below it to indicate a rock fall from the roof.

#### INTERIOR STRUCTURES

The interiors of these caves are somewhat nonstandard, in that stalactites and stalagmites are absent (with one possible exception), and in their place are large curtains of flowstone, firmly attached to the cave walls.

The amount of flowstone on the cave floors is also disproportionately small. In most caves, the volume of material added to the floors far exceeds that hanging from the walls and ceilings. In the Camelback Caves, however, practically all the "cave onyx" is attached to the walls.

A generalized section of a cave is shown in Fig. 7. Here, the flowstone deposits are the "pillars and lily pads" suggesting deposition during a period of falling water table. The floor complex, consisting of fine blow sand, mixed with fallen roof blocks, rests directly on bed-rock surfaces in most instances, with very small deposits of flowstone on a few of the fallen roof blocks. Thickness of the

floor complex, in most places, is less than five feet.

Veneered onto, and mixed with, the flowstone in caves one and three, are thin deposits of calcareous tufa, containing diatom skeletons, indicating deposition in fresh or brackish, but not saturated, water. (Fig. 8). Over this tufa, in Cave No. 1, is a crust of crystalline salt, some of the crystals being tabular, and as much as  $\frac{3}{4}$ " by  $\frac{3}{4}$ " by  $\frac{1}{4}$ ".

Resting upon, and sometimes mixed with, the floor complex are deposits of guano, nowhere exceeding four feet in thickness. This guano, which was investigated in some detail, is quite fresh, and contains no bones or other remains of any animals not now living in the area.

#### WATER CIRCULATION

Limestone caves, of the type here described, require a very definite, but not necessarily fast, water circulation, which dissolves limestone in its course through the rock, and deposits it when the water evaporates. Although the exact chemical processes are by no means as simple as some textbook writers would have us believe, water, and a reasonably steady supply of it, is absolutely necessary for the formation of stalactites, stalagmites, flowstone curtains, and similar features.

These caves today are several hundred

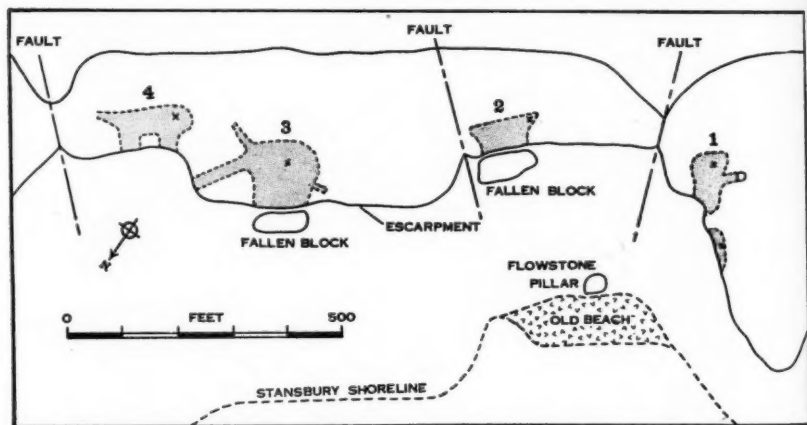


Fig. 4. Sketch map of the Camelback Caves. Small cross in each cave indicates position of sump flowstone deposits, now "out in the open", suggest that caves one and two and the flowstone pillar here shown were once parts of a single large cavern; and that caves three and four were once joined by an outer chamber, now collapsed.



Fig. 5. Entrance to Cave No. 4. Note the thinness of the roof, and the exposed flowstone (right), from which it is concluded that a large chamber formerly existed in front of the present cave entrance.

feet above the local water table. Rainfall in the area is approximately eight inches annually, while atmospheric conditions are such that more than 150 inches of water could be evaporated each year, were it available. Relative humidity, as a natural consequence, is so low that salt crystals on the cave walls retain their tabular structure for many years (possibly for many centuries).

The sumps of the caves, on the other hand, are relatively large, and are capable of carrying away to some unknown underground region a relatively large quantity of water, such as might be expected in an area having about 80 inches of rainfall annually, and a potential evaporation of perhaps 60 inches.

This absence of water supply and water circulation, coupled with ample evidence that the outflow from the cave was once great, strongly suggests that the caves were formed during a period much more humid than the present.

#### HISTORY OF CAVES

From a comparison of conditions in the general environment of the Camelback Caves with hydrographic occurrences as evidenced by the flowstone formations and other cave substructures, a tentative history of the caves may be derived, and from it an entirely plausible explanation of the lack of ancient human or mammalian remains within them.

Condition of the flowstone curtains and wall columns within the caves shows that their deposition occurred after the last major displacements in the area, for all of the structures are substantially vertical. This immediately shows that the flowstone sheets were deposited after Miocene time, when the most recent major folding in the area is supposed to have taken place.

Hydrographic conditions are such that the deposition could not have taken place except under a climatic regime very much more humid than at present. Several such



Fig. 6. Upper entrance to Cave No. 1. Lt. Col. Thomas G. Thompson stands beside it to give scale.

"wet spells" occurred in the Pleistocene, some of them so intense that the ridge containing the caves was submerged under about 500 feet of water.

As the fragile "column and lily pad" flowstone structures indicate a falling water level, which would also inhibit deposition on the cave floors (then under water), and the flowstones were deposited uninterruptedly once they started, only one of these "wet spells"—the time of recession of the Provo Stage of Lake Bonneville,—meets all the necessary conditions.

During earlier wet periods, flowstone deposition would be interrupted by submergence, and deposits would be damaged by wave action. The two later wet periods, evidenced by the Stansbury and Dugway Lake Stages, are likewise unsuitable, for the lake waters did not rise to the levels of the cave floors during these stages.

Collateral evidence is given by the presence of algal tufas in intimate proximity to the flowstones. These tufas,

which contain diatom skeletons, are associated with algal growths in water that is fresh to salty, but not saturated.

According to evidence collected by Gilbert (1), and amply checked by later workers, the Provo level of Lake Bonneville had an outlet to the sea (via the Snake River), and hence was fresh. All stages more recent than the Provo, however, had no outflow, and the salinity of the waters increased with time, so that the present Great Salt Lake, occupying a small portions of the ancient Bonneville basin, is almost a saturated salt solution.

It should be obvious that this reasoning, while dating the now-extant flowstone deposits in the caves, does not indicate the date of formation of the major openings, which can very reasonably be referred to wave action, or solution, or both, during some very much earlier phase in the development of the regional topography.

The best dating now available for Fol-

Gilbert, G. K., *Lake Bonneville*, U. S. Geol. Survey Monograph No. 1, 1890.

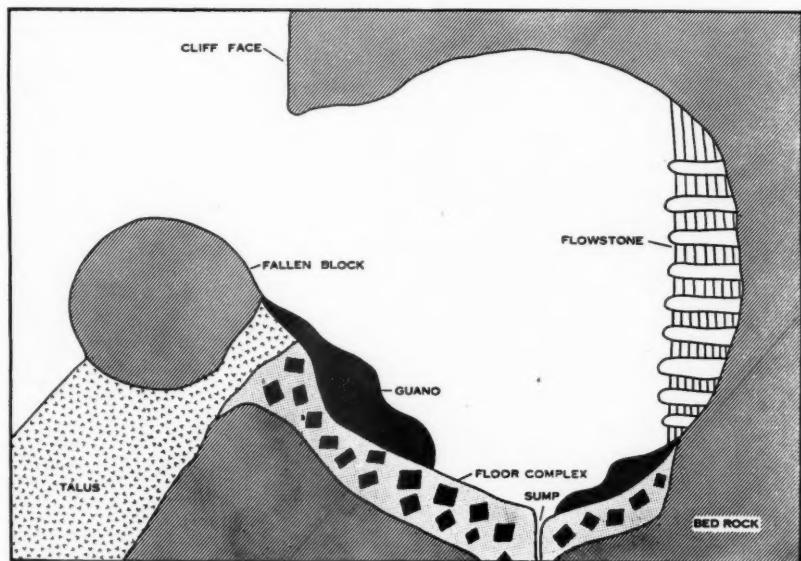


Fig. 7. Generalized section of a cave on Camelback Mountain. Note the absence of flowstone deposits on the floor.

som Man, and for the giant mammals that he hunted, indicates that he lived 15,000 to 25,000 years ago. During this interval, the Camelback Caves were either under water or very wet internally, so that ancient man and the animals he hunted either could not get into the caves, or did not find them suitable as habitations.

Accordingly, absence of evidence of

both ancient man and now-extinct mammals from these caves is entirely reasonable.

### CONCLUSIONS

The Camelback Caves apparently owe their present form to climatic changes occurring in the latter part of the Pleistocene, when the waters of the Provo Stage of Lake Bonneville were receding.

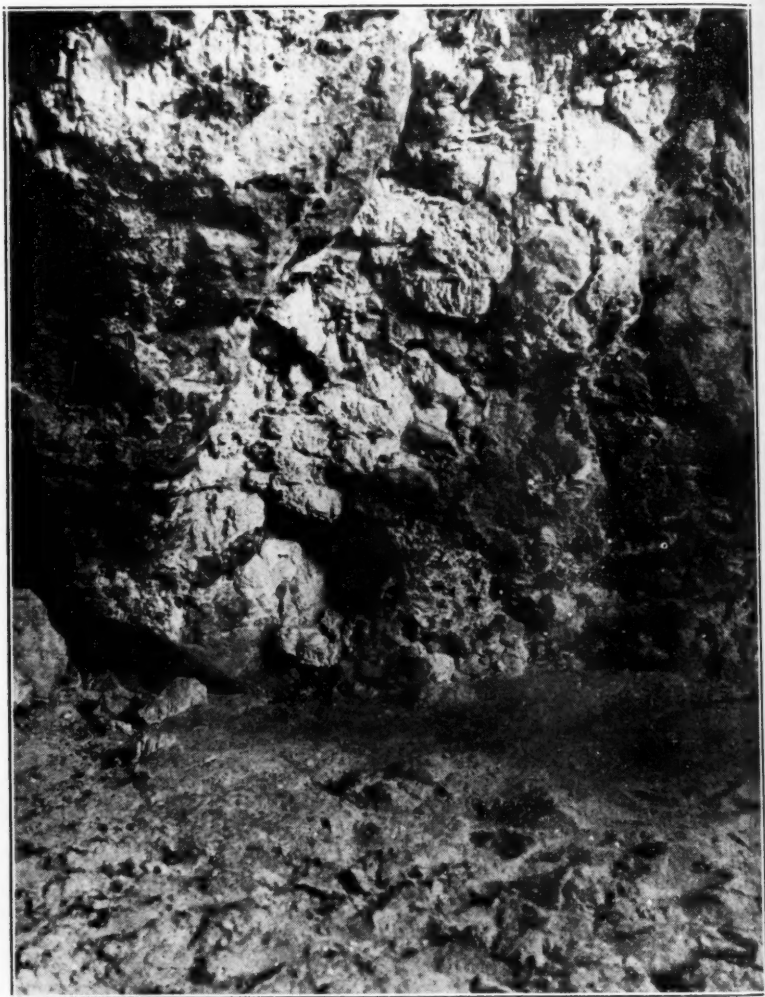


Fig. 8. Flowstone in Cave No. 1, veneered and mixed with tufa, and thinly covered with tabular salt crystals.



In consequence, the caves were not accessible to ancient man, or to the animals he hunted, so that absence of ancient human or animal remains from the caves is to be expected.

Several score of other caves, at various levels and locations in the Bonneville Basin, remain to be explored and studied. Should bones of extinct mammals be found in any of them in proximity to suspected human remains or artifacts, it is recommended that very complete records be kept of each step in the excavation,

and that the U. S. National Museum, or some other reputable research organization, be notified, preferably before the materials are removed from the matrix.

Dugway Proving Ground  
Tooele, Utah.

October 29, 1945.

#### ACKNOWLEDGMENT

The writer is indebted to Lt. Col. Thomas G. Thompson, now overseas, for assistance in the field, valuable suggestions, and a critical reading of this manuscript.

### A Garnet Reaction

Editor R & M:

Below is a letter received from an old friend of mine living in Iowa who manufactures shirts, pajamas and other clothing for the farmers of the corn belt and who has as hobbies the birds, flowers and scenery of the west. He moors here and there as the spirit moves him. I had sent him a recent copy of *Rocks and Minerals* containing one of my articles on garnets, hoping it would produce an interesting reaction. He reacted as follows:

"You are getting too doggone learned to suit me. If I came to call I'd have to carry an encyclopedia with me—or bring along as interpreter a member of the Museum staff. I wouldn't understand anything you were saying. Who's put you up to all of this—Hatfield Goudrey? What's it all about? You can't take 'em with you.

"But in spite of my low opinion of garnet collectors and crystallographers, I found myself doing some kind of garden work recently on Lake Superior. I found a great big friable chunk of solidified mud—black, from the Devil's ink pot, but in the middle of it there were the prettiest quartz (?) crystals in white, green and pale pink—all piled together to make mountains and valleys. And in other equally repulsive chunks of this erstwhile mud, I'll be darned if there weren't incipient millions of Thomsonites. Twenty miles down the shore I came upon the real home of the Thomsonite and three miles away I found crystals in the shape of flat fans that looked as though they had been hammered into the rocks. The water had eroded the stone all around them and left them as bas reliefs.

"All of these rich finds were on private property and I was just an ordinary heel of a trespasser. Do you, too, have to trespass when you are out garnet hunting?

"Did I tell you that at a Centennial party at our golf club last year my wife wore among other things a gorgeous necklace and brooch of garnets which were cut like gems and were bought in Vienna years ago? The woman who

owned them died last week. I suppose they will now be sold."

P. S. "I forgot to mention that most of my 'finds' were not 'in situ' but in glacial drift."

J. N. Trainer  
New York City

February 10th, 1948

#### Pacific Mineral Society Advertises

Beginning with this issue, the Pacific Mineral Society, of Los Angeles, Calif., will advertise its meetings. The advertisement is only a small one but it will run for one full year. A paragraph from the letter of the Secretary, N. L. Martin, who sent in the ad reads:

"We feel such an ad will help visitors to our city to find kindred spirits and help to promote a wider acquaintance among rock hounds. We shall see if we are dreaming."

We recommend this idea to clubs in general. If the Pacific Mineral Society feels it is a good idea, other clubs should take notice of it and follow suit.

*Mineral Collecting in the Lower Peninsula of Michigan:* This is Publication No. 2 (1947 Annual) of the Michigan Mineralogical Society. It contains five very interesting articles as follows: "Geology of the Michigan Gypsum Deposits", by Willard H. Parsons; "Gypsum at Grand Rapids and Alabaster", by Walter P. Nickell; "Petoskey Stones", by Mary L. and Ralph T. Pellett; "Jasper Conglomerate Boulders", by James William Bay; and "Salt", by Clayton E. Holder.

This 16-page publication (with 6 illus.) costs 40 cents and is for sale by the Michigan Mineralogical Society, Cranbrook Institute of Science, Bloomfield Hills, Mich.

### John L. Funk (Obituary Notice)

John L. Funk, of Laramie, Wyo., who for many years was a dealer in minerals (Wyoming Minerals) died on Jan. 19, 1948, as a result of a coronary occlusion. He was 61 years old.

His brother, Rush A. Funk, is his sole beneficiary under his will, and will undoubtedly continue with the mineral business.



## A ROCKHOUND GOES VISITING

By J. J. BROWN

President, State Mineral Society of Texas  
302 Walton Bldg., Austin 11, Texas

The American Vocational Association, of which I am a vice-president representing Vocational Rehabilitation, held the annual meeting of the American Vocational Association in Los Angeles, California, December 15, 16, and 17, 1947. As a vice-president of this large organization, which is composed of all the teachers throughout the United States who are engaged in the field of agriculture, home-making, trade and industrial work, industrial arts, and rehabilitation, it was necessary that we arrive in California ahead of the main meeting and remain for a few days after the convention in order to assist in managing the affairs of the Association. We took advantage of our trip to Los Angeles from every standpoint, studying what was being done in the field of rehabilitation, and never for one moment losing sight of the fact that we wanted to know what others were doing in the field of lapidary work. It is our feeling that perhaps the members of our State Society may be interested in the following account of our trip.

### T. J. Whiddon visited

We left Austin, Texas, at noon and spent the first night in Sanderson, Texas, stopping on the way at the little town of Shumla, which is nothing more than a filling station and general store owned by T. J. Whiddon who formerly lived in the Sutton County area. Mr. Whiddon was offering for sale both cutting rocks and cabochons of agate material which had been secured in the Big Bend area of southwestern Texas, and had been left with him to sell by someone living in Bandera, Texas. Perhaps due to the poor lighting of the store and the lateness of the afternoon, the agate being offered for sale certainly appeared to be of a very inferior quality, and it is our feeling that the prices asked for the beautiful cabochons were above the value of the cabochons.

### J. F. Woodard visited

After leaving Sanderson the next morn-

ing, we stopped in Alpine, Texas, at the residence of J. F. Woodard where we were met by Mr. Woodard's young son about eighteen years of age. We regret to a great extent that we did not have a chance to meet Frank Woodard who specializes in plume agate and beautiful plume agate slabs. We found Mr. Woodard's boy to be a young man of an excellent personality, highly intelligent, and greatly interested in his father's business. Mr. Woodard's son gave us some beautiful specimen material to take with us to show other rockhounds what might be secured in the Big Bend area, and may we state here, that on our entire trip we never saw any agate anywhere that surpassed that being sold by Frank Woodard of Alpine, Texas. Frank Woodard can justly be proud of his son whom we predict will make his mark in this world.

We wanted to visit A. J. Burgard, another member of our Society in Alpine, but we did not have time.

### John Bennett and Ray Miller

Just before reaching Alpine, we inquired in Marathon as to the whereabouts of a good member of our Society by the name of John Bennett. John Bennett and Ray Miller of Marathon are beginning to get into the rock business on a commercial scale. We were led to believe that Mr. Miller has been securing selenite specimens from the Terlingua area. It may be that we may have our wires crossed, but we believe that Mr. Miller has been getting material for our Memorial Museum here in Austin.

### Amador Hotel visited

We had planned to do some visiting in El Paso but passed through El Paso rather early in the afternoon and stopped in Las Cruces, New Mexico, for about an hour. In Las Cruces we visited the Amador Hotel which is one hundred years old and recommended by Duncan Hines. Truly this hotel is exactly what had been said about it in national publications. It is unique in that the lobby, the walls, and

the anterooms, in fact the entire place, is filled with antiques of great value and interest to anyone interested in New Mexico. We could not help but note that all the rooms in this hotel are not numbered but are given such names as Carolita, Margarita, Carmen, and other names of similar motif. Among the various things to be noted in this lobby was the life-sized figure of a bull fighter dressed exactly as bull fighters are dressed. This gentleman had the appearance of being just ready and willing to enter the bull ring in Old Madrid, Spain, or perhaps Juarez, Mexico.

#### **Cowboy Lemley**

In Las Cruces we had great difficulty in finding the headquarters of Cowboy Lemley. Mr. Lemley advertises rather extensively in our National Mineralogical Magazine, and we found that his chief interest appeared to be in relics such as old pistols, swords, daggers, bayonets, Indian relics and bead work, fossils, glassware, and Old West photographs.

Las Cruces was named for the crosses that mark the graves of massacred pioneers and much information concerning the early history of Las Cruces is shown in the Amador Hotel. Just before reaching Las Cruces you pass through the small town of Mesilla Park whose jail once housed Billy the Kid. At one time Las Cruces was the capital of a vast domain including all of Arizona, and it would not be fair to Las Cruces if we did not mention that they have a large number of very, very fine tourist courts with outside walls having many beautiful Mexican and Indian paintings depicting beautiful Mexican and Spanish scenes. The paintings were noted on the outside walls of two large tourist motels.

#### **Dr. R. E. Anderson visited**

We left Las Cruces very late in the evening and drove on to Deming, New Mexico, where we found many excellent tourist camps reasonable in prices, and the one occupied by Mrs. Brown and myself had a kitchenette. Needless to say, Mrs. Brown and myself cooked an excellent supper with all the trimmings from every standpoint. Immediately after supper, we drove just a few blocks to the home of Dr. R. E. Anderson where my

wife and I were cordially received by Dr. Anderson and his wife in their beautiful home surrounded by an excellent rock fence. I had read on various occasions of the collection of fluorescent material of Dr. Anderson; however, the display which greeted our eyes was far beyond our expectations. The collection of Dr. Anderson is for sale at a price of \$3,000 and includes tons of beautiful fluorescent material which has been gathered from the four corners of this country. Mrs. Anderson has a deep interest, of course, in the Anderson collection, but she also has as a hobby that of painting. Incidentally, Dr. Anderson showed us how to test scheelite. Not only did Dr. Anderson have for display many types of minerals that were very fluorescent, but he also had articles of clothing, stinging scorpions, and porcupine quills that would fluoresce with great beauty. We noted many, many types of lamps used for fluorescing purposes such as a large Mineralight; also a cold quartz light with a wave length of 2537 without filter aimed to bring out all the individual shades, especially of the pinks and reds. We noted a small portable camp type lantern equipped with a sylvanite black light tube. Of course, we noted many, many specimens of willemite, franklinite, zincite, pink calcite, scheelite, wernerite, and aragonite, and many specimens showing two phases of minerals, such as the secondary uranium salts and manganese. We might mention here that in 1940 in Lubbock, Dr. Anderson appeared before the American Society for the Advancement of Science on their twenty-first anniversary and talked upon the subject of fluorescent minerals. It was indeed a pleasure for my wife and me to visit the home of Dr. Anderson who presented us with a four or five pound chunk of New Mexico fluorescent calcite of two colors under the light. It is my prediction that anyone could purchase the exhibit of Dr. Anderson and commercialize with his exhibit since he not only has great quantity and great variety, but an excellent quality of material. After viewing Dr. Anderson's wonderful fluorescent exhibit, it was our

pleasure to inspect many polished specimens at his home. An invitation was extended to Dr. Anderson to come to our mineralogical show next April.

#### **James T. Lawyer visited**

Just before going over to Dr. Anderson's house, we called at the home of James T. Lawyer living at 923 W. Birch Street, Deming. Mr. Lawyer was not at home; however, we were given every courtesy by his wife and mother-in-law and the pleasure of seeing his beautiful specimens. We left some fluorescent agate which we had collected in the Big Bend area which fluoresces green and stated that we would call on our return trip since Mrs. Lawyer had explained that her husband was a disabled war veteran attending the College of Mines at Socorro, New Mexico, and furthermore that he would be home by the 20th of December.

Mr. W. W. Wilkins, formerly a barber in Deming, was reported to us as having a large amount of material for sale. However, we did not have Mr. Wilkins' address and had no way of locating him. Therefore, we have no idea of the type of material that he is offering for sale.

The next morning we drove through arid and irrigated sections on to Tucson for lunch, stopping enroute at Benson. At Benson we had planned on visiting D. V. Satterlee who advertises beautiful banded fluorspar in three colors. Inquiring in Benson, we were informed that Mr. Satterlee had moved to Florida. Furthermore, we found that there was a large fluorspar mine near Benson, but we did not have a chance to visit the mine.

#### **J. C. Turpen visited**

We found Tucson, Arizona, in the height of its tourist season on account of the bright sunshine, and hundreds of tourist courts, the finest to be found anywhere, with rather high prices. Tourists were in the stores, on the streets, on the highways, in fact, they were everywhere. After lunch in Tucson, we drove out to the home of Mr. J. C. Turpen living at 2010 E. 9th Street. Mr. Turpen was not at home; however, we were greeted by his charming daughter and noted his

beautiful home. His daughter gave us excellent directions on how to get to his shop, and we immediately drove out to his shop which is located at 2407 Hedrick Drive. We liked Mr. Turpen from the time that we met him until we left at his place of business. Mr. Turpen is the type of man you like to be with in business or pleasure or in his own home. He is busily engaged in lapidary work much machinery was to be seen in his shop and many articles that had been made by him. Mr. Turpen makes many, many turquoise cabochons and fits them in rings and had quite a business establishment in the lapidary field. We noted beautiful belt buckles inlaid with turquoise which were made by him. Mr. Turpen has for sale, beautiful beyond words, painted desert agate at a price of \$1.00 per pound. Mr. Turpen has this cutting agate in all combinations of colors, much of which is a clear white with deep red desert scenic splotches over the agate. It is truly a beautiful agate, and anyone needing excellent cutting material of the desert agate type can secure the same from this honest-to-God lapidarist making his living in the field of lapidary. We gave Mr. Turpen a few small pieces of fluorescent agate and were simply appalled and embarrassed at the generosity of this good man. He gave us a box full of his good cutting material. Mr. Turpen is proud of his work as an artisan. He is proud of his standing from the standpoint of honesty and integrity, and may we say here that he is not of the avaricious type but wants to share with others the pleasure he gets from his vocation. We hope that Mr. Turpen will send a display to our mineral show this spring.

Truly Tucson is a city worth visiting. You will see people lolling around the tourist courts from Hollywood, New York, and other points. Within two hours' time you will find these same people skiing down the mountainsides of the mountains. Tucson is permeated from one end of the town to the other with tourists—beautiful women wearing jodhpurs and cowboy habits and you will find dude ranches in every direction. We are also

going back to Tucson when the ship comes in, and we also are going back to visit Mr. Turpen if we are ever in Arizona.

We left Tucson about 2 P. M., and drove through arid country with mountains on every hand and irrigation at intervals on into Gila Bend where we spent the night at a lovely tourist motel. Incidentally, it was not supposed to be cold in Gila Bend since it is located in the southern part of Arizona; however, at the time of our visit in Gila Bend the thermometer was around 30 with frost covering everything. On the way from Tucson to Gila Bend and just before passing through Casa Grande, we came to the little town of Eloy, Arizona.

#### Bill Trager

Driving into Eloy we ran into a terrific dust storm which was followed by pelting rain. Eloy is a small town growing rapidly, with irrigation on every hand. At Eloy we wanted to visit Bill Trager who advertises beautiful chrysocolla and malachite. Mr. Trager had given as his address Box 935. We want it to go on record here and now by stating we think the greatest mistake that any person can make is to advertise and give a box number. We tried all over Eloy to find Bill Trager. The postoffice would not give us his address and no one seemed to know him. Frankly, we never intend to spend another minute of our time in hunting a person who simply gives his box number. We wasted time in hunting Cowboy Lemley in Las Cruces and we again wasted time in hunting Bill Trager in a dust storm in Eloy. As far as we are concerned he can keep his chrysocolla and malachite until such time as we are furnished with directions to his home.

#### Yuma, Arizona

After spending the night in Gila Bend, we drove on into Yuma and visited the old ruins and viewed the wedding chapels which were to be seen on every hand. In case anyone wants to get married, you can secure a wedding chapel in Yuma with flower girls, choir, preacher, and all for \$100, or as a justice of the peace advertises on every hand, he will marry you for

\$5.00 and guarantee a long future life for you. Yuma is growing very fast since this is the beginning of the heavy irrigating district from the American Canal. Many Indians are to be seen on every street corner in Yuma since the town is close to a large Indian reservation. We saw many Oakies in Yuma who had evidently migrated into this section picking cotton. The Oakies we saw had not availed themselves with the water of the American Canal, and if the barbers depend on these boys for their business they will be disappointed. We felt very sorry for these migratory laborers, but we also noted their attitude about going to work for a man who was attempting to employ some of them. It was amazing to see a person who, if shaken upside down, a dime would not drop out of his pocket, yet he would want to know about the wages and about the number of hours that he would have to work when approached by persons needing help on their farms.

In driving into Yuma in the edge of town, we noted a few rock dealers, priced some of their rocks, looked at the type of material they had for sale, and drove on, since they appeared to be fly-by-night dealers. At Yuma we had to pass an inspection station, and we are still at a loss to understand why they give every single car and every piece of baggage such a rigid inspection. Since we had taken with us from Texas about 200 pounds of fluorescent agate, we were a little amazed to note the scrutiny that was given the rocks that we had in the car. The California authorities are afraid someone will bring pests, insects, and disease to their irrigated farms. We explained to the authorities that every rock had been washed and that one of the best things that we could say about the hobby of collecting rocks was the fact that bugs did not eat on them and neither are they destroyed by termites and neither do they require moisture, rain, sunshine or mothballs to preserve their beauty.

#### Ed Rochester

Just a few miles out of Yuma and just before entering the barren sand desert,

we came to the town of Winterhaven, where we were very anxious to call on Ed Rochester who sold fluorescent minerals and specialized in Arizona calcite banded with fluorspar. Mr. Rochester in his advertisements gave Box 356 as his address. We inquired at the postoffice about him and learned from the postmistress that he was a very fine man and had very beautiful minerals to sell, and furthermore, that he sold much material. We were informed that he lived about thirty miles out of a city by the name of Picacho. Had we realized before leaving home the necessity of getting directions to rockhounds' homes, we would have allowed enough time to visit Ed Rochester. We again state rockhounds should give directions relative to reaching their places of business. From what the postmistress told us, we feel sure that we missed a great deal by not driving on out to Ed Rochester's home and trading fluorescent material with him. The postmistress at Winterhaven was indeed a courteous, polite, intelligent woman and a friend of Ed Rochester.

#### **Desert Magazine office visited**

After leaving Winterhaven, for many miles we could see the signs of the old boardwalk crossing the desert. Shortly after passing the desert, we arrived in El Centro, Calif., in time for lunch and immediately called at the offices of the *Desert Magazine* and were greeted by a Mrs. Brown, Mr. Henderson, the Editor, being out. The *Desert Magazine* is housed in a beautiful building with proper atmosphere and motif throughout the establishment. We deeply regret that we did not have a chance to see Mr. Henderson. Knowing that *Desert Magazine* would one day move to new quarters we told Mrs. Brown that Mr. Henderson should be ashamed of leaving such a beautiful building in such a nice town as El Centro. Later we had the pleasure of seeing the new 40-acre site of *Desert Magazine*, and frankly we now congratulate Mr. Henderson for his choice of a future home for the *Desert Magazine*. The future home is located near Palm Springs at the Palm Desert Development. You can

imagine our surprise in visiting the *Desert Magazine* office to find that Mrs. Brown knew practically every agate bed in the Big Bend section, and incidentally, all the way along the road on our trip to California we encountered various rockhounds who had in years gone by secured enormous amounts of agate from the Big Bend area. At El Centro we inquired as to the whereabouts of Dr. Warren P. Fox and Charles Carroll, rockhounds who formerly lived at El Centro, but were advised they no longer lived in El Centro. The Barbara Worth Hotel in El Centro is indeed a beautiful hotel, and my wife and I enjoyed a wonderful meal at the Barbara Worth Hotel in El Centro. Incidentally, El Centro is about 75 feet below sea-level and is close to Calexico which joins Mexicali in Old Mexico with all the charm and color of Old Mexico. El Centro is the shipping point of the products of the Imperial Valley, and incidentally, the All-American Canal along whose banks you often drive between Yuma and El Centro, is 80 miles long, 200 feet wide, and delivers around 15,000 cubic feet of water per second to the Imperial Valley.

#### **Guy O. Glazier visited**

Leaving El Centro around 2:30 P. M., we travelled through an irrigated date country for a while purchasing dates (which later gave me a stomachache), on over the mountains into San Diego, Calif. Stopping by the side of the road a few minutes the other side of Jacumba, we met a grand old fellow by the name of Glazier. We used the word "old" for the simple reason that Mr. Glazier has a great mass of white hair, his face is very ruddy, and he has a twinkle in his eye, but we doubt rather seriously whether he is over sixty-five years of age. Anyway, his wife sells Indian blankets and rocks by the side of the road. Mrs. Brown purchased some corn-cob salt shakers, and I traded for one or two geodes from Utah. Anyone going from Jacumba to San Diego should stop by the side of the road and see Guy O. Glazier. He is right on Highway 80 near Boulevard, California.

#### **Balboa Park**

We arrived in San Diego about

6 P. M. and went directly to the Travel Lodge, a very fine motel, combed my hair, and Mrs. Brown and myself were on our way to Tijuana hoping to have a real treat with a Mexican dinner in one of the large night clubs. We got to a large night club, perfectly beautiful inside, a fine orchestra, very high-priced, and the poorest Mexican dinner I have ever had in my life. Anyway, we enjoyed Tijuana and drove back to Chula Vista into San Diego. Our first day in San Diego was spent over on the beaches and around the naval base and in Balboa Park. I cannot help but mention here no one should ever attempt to visit the zoo in Balboa Park while walking. There is a large bus that goes in front of the cages in the zoo. As the man drives in front of each place where animals are kept, he calls animals by name, throws them crackers and peanuts, and each animal from the ostrich to the giraffe seems to know when the bus is to arrive and they come up to the side of the bus to be fed. The fifty cents paid to the bus driver is certainly worth the money in Balboa Park. This park comprises 1400 acres in the heart of San Diego. We drove out to LaJolla and to Scripps Oceanography where we had the pleasure of seeing fish in the various aquariums; also seeing fish that have habitats 5,000 feet below sea-level, 4,000, 3,000 etc., up to the surface. The aquarium of this institution is free to the public. Of course, we visited Junipere Serra, erected in memory of this noted priest.

#### **Mission Mineral Mart visited**

However, back to rocks in San Diego. It was our great pleasure to visit the Mission Mineral Mart located at 818 Ft. Stockton Drive, San Diego. This mineral mart sells minerals, gems, and lapidary supplies, and is owned by Roy Plummer and Ralph T. Salsbury. Mr. Salsbury is president of the San Diego Mineral Society. While we did not get to talk to him very much, we feel sure that San Diego is fortunate in having such a man as its president. We spent quite a great deal of time with his partner, Roy Plummer, and found him to be a very intelligent, polite gentleman, interested in the other fellow's problems and willing to

trade minerals with you or sell you minerals. We were fortunate in trading him 40 or 50 pounds of fluorescent agate for 55 pounds of geodes. My impression of the Mission Mineral Mart is none other than that this establishment is well managed by two gentlemen. They have many beautiful specimens and much good cutting material for sale, and it is our opinion that both of these gentlemen will deal fairly with their fellow rockhounds. We hope to spend more time at the Mission Mineral Mart the next time we are in San Diego.

#### **C. A. Scott visited**

From the Mission Mineral Mart, we spent much time with Mr. C. A. Scott, living at 3458 Monroe Avenue, San Diego. Mr. Scott is a man after my own heart and for perhaps two or three hours this good man showed to myself and my wife his collection consisting of all types of specimen material, a great array of polished slabs, and beautiful cabochons and interesting geodes. We might mention that he had a large microscope some six or seven inches across which was fixed so that you could look down into a geode upon which a light was shining. Our visit to Mr. Scott is indeed one of our bright spots of our trip to California. We hope some day we will have the pleasure of having him visit us here in Texas. Mr. Scott's wife enjoys not only his hobby, but has as hers a wonderful collection of shells of all types and of all kinds of great beauty.

#### **Mr. and Mrs. J. B. Stetson visited**

We left Mr. Scott's house after dark and were back again the next morning and accompanied him to the home of Mr. and Mrs. J. B. Stetson who are lapidarists and jewelers. We are under the impression that J. B. Stetson is a great-great-grandson of the founder of the Stetson Hat Company. Anyway, the Stetsons live at 2550 Ridgeway, National City, California, which is a suburb of San Diego. Mrs. Stetson does faceting work and Mr. Stetson does silversmithing and also lapidary work. We left \$35.00 worth of turquoise cabochons with the request that if Mr. Stetson wanted to purchase the same,



all right, send us \$35.00, and if he did not, to send the rocks to us in Los Angeles. Upon our return to Texas, we received a check for \$35.00 from the Gem Art Company, run by friends of theirs, to whom Mr. Stetson had shown our cabochons. It was a pleasure for us to visit their home, and we deeply regret that Mr. Stetson was not present. Incidentally, Mr. Stetson has appeared in many wrestling arenas in these United States.

#### **George L. Ritchie visited**

We visited Mr. Scott's good friend, George L. Ritchie, Sales Manager of the Great Western Oil-Controlled Diamond Saws factory, 740 Hilltop Drive, Chula Vista, Calif., and we are of the opinion the Great Western Oil-Controlled Diamond Saws are quite an innovation in the field of lapidary equipment. This saw has only been on the market a short time, and it may be that all the quirks are not out of it. However, it does do a remarkable job of cutting slabs. As a matter of fact, the slabs are so well cut that it leaves very little work to be done on the lap. We are going to do our best to get Mr. Ritchie to show his saw at the meeting of our State Mineral Society here in April. Mr. Ritchie, unfortunately, was not at home, and we only had a chance to talk to Mrs. Ritchie at the time of our visit.

#### **El Camino Shop visited**

After spending two days in San Diego, we left for Los Angeles, and our first stop was made at the El Camino Shop at Solana Beach. We traded an old Belgian pistol to the El Camino Shop for \$18.00 worth of adamite and sold for \$18.00 cash, three Arkansas crystal specimens. The name of the proprietor of the El Camino Shop is Ed Devereaux. He is a very affable gentleman, but is a pretty shrewd trader. The things you have are not worth much and the things he owns are very valuable. No fault of his, and we guess it is a pretty good virtue for a prune picker to have in dealing with a Texas Longhorn.

#### **Elliott Gem Shop**

It was rather late in the afternoon when we reached Long Beach and previous reservations had been made at a motel in

Long Beach. The next morning after reaching Long Beach, we drove to the Jergens Arcade to visit Elliott's Gem Shop and were confronted with a large sign, "This shop opens at 12 o'clock." Up until the present time we have never seen a more elaborate display of gems set in brooches and rings than we saw through the display windows of the Elliott Gem Shop.

#### **Highland Park Lapidary Supply Co. Ultra-Violet Products, Inc.**

After leaving Long Beach we settled down for a week's stay at the Biltmore Hotel where duties as Vice-president of the American Vocational Association called for the larger portion of our time. However, we managed to visit the Highland Park Saw people and were courteously treated. We had a wonderful visit with the Ultra-Violet Products people and saw their new \$12.50 Mineralight and their fluorescent display.

#### **Grieger's Visited**

We called at Grieger's, in Pasadena, and noted their large stock of lapidary supplies. Time did not permit us to spend as much time at this large establishment as we would have liked to spend.

We visited a few other strictly commercial dealers of jewelry set with Montana moss agate but did not see any that compared with that of the Elliott Gem Shop.

#### **Leland Quick visited**

Mr. Leland Quick, Editor of the *Lapidary Journal*, invited us to be his guest at the Los Angeles Athletic Club where we enjoyed a wonderful fried chicken dinner. To meet Leland Quick is to admire him. He has a fine personality, a dignified bearing, is a highly intelligent mineralogist and successful business man. We made arrangements to visit him at Palm Springs the following Sunday but as we left the city sooner than we expected we did not get to see him any more. Mr. Quick is certainly a booster for all the reliable dealers. We certainly hope that the time will arrive when the Mineral Society can invite Mr. Quick to appear before our organization here in Texas.

#### **New portable show case**

Mr. Morton J. Bachrach of the Ameri-



can Plastics Company of Burlingame, Calif., came to our room and demonstrated to us their new plexiglas portable show case. This is a nice show case; however, we did not get to see the finished product since improvements are made daily on them. We hope that some member of our Society will purchase one of these portable show cases and have the same on demonstration at our mineral show. It would be nice if everyone at the show was to purchase one of these cases but we do not believe it possible for us to do so until the price is lowered. At the present time these show cases, two feet wide and two feet long, can be purchased for \$40.00 a piece in one hundred lots or singly for \$60.00.

#### **Chuck Jordan visited**

Perhaps one of the outstanding visits made by us to a rockhound was in El Monte to the establishment of Chuck Jordan. To know Chuck Jordan is to love him, to see his specimens is to admire them. As we talked to him we saw the fairness with which he deals with his fellowman. Anybody dealing with Chuck Jordan will never be disappointed. Chuck Jordan specializes in Nevada rhodonite at 75 cents a pound or 10 cents a square inch in slabs. He has a great assortment of cabochon material and his address is 453 E. Garvey Boulevard, El Monte, California. We hope that Chuck Jordan and his assistant who is Mrs. Crowder and who was so lovely to us at the time of our visit will both come to Texas sometime and visit us.

#### **Mission of San Juan Capistrano**

We will now digress for a few moments from the matter of rocks to that of other things in Los Angeles and vicinity. On our way from San Diego to Long Beach, we stopped at the Mission of San Juan Capistrano. This Mission was founded by Father Junipero Serra of the Franciscan Order on November 1st, 1776. While it contains the oldest church building in the state, it is the seventh in California in order of establishment. The Mission is located in Orange County on the main highway about halfway between the cities of Los Angeles and San Diego.

It is named after San Juan Capistrano, or St. John, a native of Capistrano, which is a town in the Abruzzi in Italy. This Mission, like all other Missions in California, was established for the noble purpose of civilizing the Indians, teaching them the Christian religion and useful industries and making them self-supporting. The material used in the construction of the Mission were boulders, adobe, sandstone and iron, beside the tile, mortar and raw-hide. As you enter the beautiful grounds of this famous Mission, you can purchase popcorn to feed the hundreds of pigeons that are everywhere on the Mission grounds. These pigeons are so tame that they will light on your head or your shoulders; as a matter of fact, they will entirely cover you in their desire to get you to feed them. This Mission is known all over the world on account of the fact that for nearly one hundred years swallows have left the Mission on St. John's Day, October 23, returning on St. Joseph's Day, March 19.

#### **Interesting spots visited around Los Angeles**

We visited the famed LaBrea Pits in Los Angeles, from whose bubbling tar notable collections of fossil remains of prehistoric animals have been taken. Other places of interest visited were Griffith Park, Wilshire Boulevard, Hollywood, Glendale, Kellogg Arabian Horse Farm near Pomona, Knott's Berry Farm near Buena Park, Bernheimer Japanese Gardens (rundown and not worth visiting), the Gays Lion Farm, written up in all the literature concerning California. Chambers of Commerce should read the next statement. There has not been a lion at this farm in the last six years. Tom Brennaman's Breakfast Club was visited and Charlie McCarthy and Edgar Bergen entertained our group, as well as Shirley Dinsdale, who is one of Hollywood's most popular entertainers, having appeared on numerous programs with Rudy Vallee, Bobby Burns, Eddie Cantor, and Nelson Eddy. Our entire group was escorted to the College of Los Angeles where we were given a lavish dinner with favors and flowers. The group was also taken to hear the radio broadcast, "The

Quiz of Two Cities," between San Francisco and Los Angeles.

#### **Farmer's Market**

The two places visited that gave us the greatest amount of enjoyment was the Knott's Berry Farm previously mentioned, and the Farmer's Market. Therefore, we will discuss in detail both of these places, and they should be on the "must visit" list of everyone going to California. The Farmer's Market is located on West 3rd and Fairfax. More than a hundred shops and stores make up the Farmer's Market. Lunch at the Farmer's Market is certainly a lunch to be long remembered. A visit to the interesting craft shops and food specialty kitchens is surely something that will be remembered all of a person's life. All of the shops and stores are owned and operated by the folks back of the counters. It is one of the biggest food markets in the world. The market smells good on account of the large amount of candy bubbling in the kettles and the flowers and the spices and the bread coming hot and fragrant from the ovens and the nuts roasting. The streets of the market are indeed gay and colorful, and you can purchase anything from old-fashioned freezer-made ice cream to white peacocks—Toucans, or a Hollywood star's duplicate diamond ring. We cannot refrain from mentioning just a few of the things to be found at the Farmer's Market where you eat in the aisles between the stores out under the great canopy of heaven. There is an airway express office, a U. S. Postoffice, a bakery, a rug shop, book shop, photograph shop, stationery shop, sign shop, avocado shop, coral reef shop, a laundry, silversmith's shop, children's shop, magazine, rabbit, pie, candy, whiskey, and gadget shops; as a matter of fact, there are at least one hundred different types of shops where you can purchase anything in the world. While the food is just a little expensive, it is certainly very, very delicious.

#### **Knott's Berry Farm**

In regard to the Knott's Berry Farm—this farm is located about 22 miles from Los Angeles in the little town of Buena Park. In 1920 Mr. and Mrs. Knott rented

two acres of land and sold berries from the roadside market. In 1927 they bought 10 acres of farm land and besides selling fresh berries began to sell berry pies and had a little two-room shack with only five tables. Mrs. Knott did the baking and the children did the serving. In 1934 the first chicken dinner was served, and from 1934 up to the present time new rooms have been added each year, and at the present time 1,000 guests can be accommodated in the seven dining rooms, and plans are already underway for having a buffalo steak restaurant. In May of this year, on one day, over 7,000 people were said to have consumed something like 36,000 biscuits. My wife and I did a good job of the chicken dinner which cost only \$1.50 and consisted of cherry rhubarb sauce, salad, fried chicken, mashed potatoes and gravy, homemade berry jam, homemade pickles, vegetables of all kinds, with boysenberry pie. We imagine this establishment today is worth around \$1,000,000 with 200 acres in berries the very finest collection of wood carving and enormous nursery and flower shop, glassware shop, and in addition to the above, you will find that they have erected a Ghost Town where you can see replicas of jails and silver dollar saloons, Indian homes, and old-time merchandise stores. Incidentally, a trip through the Ghost Town does not cost anything. All the expense incurred by the visitor is for the wonderful chicken dinner, hot biscuits, and all the trimmings. We will visit Knott's Berry Farm every time we are within fifty miles of this farm. It should be on the "must list" of everyone going to California.

We had originally planned to perhaps spend the Christmas holidays in California, but as Christmas Day grew nearer, the thoughts of our grandchildren placed myself and wife in our car and we were homeward bound after visiting many sights and scenes in and around Los Angeles, especially Hollywood Boulevard and the motion picture stars' homes.

#### **Mission Inn**

At Riverside, Calif., we visited the famous Mission Inn. We do not think

that any visit to California would be complete without a visit to the Mission Inn which has been made famous by its owner, Frank Miller. Will Rogers said in his syndicated column that Mission Inn at Riverside is the most unique hotel in America. Among the things you may expect to see at the Mission Inn and that you will enjoy are some of the following: the adobe roof sunporch, the cloister music room and the cloister walk, a trip through the court of the birds, a view of the collection of dolls and animals of the world, the famous fliers' wall, especially the Galeria, and the garden of the bells. The bells ring just before the large dining room doors are opened. Among the bells is that of a towncrier of Bedford, Massachusetts, which aroused the people of that town on the night of Paul Revere's ride. The Spanish Patio and the Spanish Art Gallery are long remembered after a visit to this famous hotel. Among the famous rooms that should be visited are the Lealea Room, the Oriental Rooms, and of a special interest in this marvelous hotel is the St. Cecilia Oratory, the St. Francis Atrio, the St. Francis Chapel, the St. Francis Vestry, and St. Joseph's Arcade. Throughout the hotel you will find souvenir, antique, and curio shops. It would not be fair if we did not mention the fact that some of the greatest paintings to be found in the United States are found in the Mission Inn. As an example, on the north wall of the Chapel hangs the Inn's finest art treasure, "The Immaculate Conception with the Mirror", by the celebrated Spanish artist, Bartolome Esteban Murillo (1617-1682). The painting is considered one of the world's masterpieces, as well as one of the loveliest of religious paintings by any old master.

#### Gem Courts visited

As we drove into Covina just before reaching Redlands, we noted the Gem Courts and stopped and traded for some geodes that showed different shifts in the development of the earth. These types of geodes are quite in demand in California, we previously having seen some of these geodes in the collection of Mr. Scott at San Diego.

#### Quartzsite, Arizona

In Indio we made a short detour through Palm Springs and did not tarry but a few seconds since the hotel rates were close to \$90 per day, and we could not afford to stay any more than about five seconds. We crossed from California into Arizona at Blyth, and of course had to go through the usual inspection to see whether or not we were contaminated from any standpoint. After entering Arizona, our first place of interest we visited was at Quartzsite, a famous old mining town made famous by the Hi-Jolly Monument. This monument was erected in memory of a Syrian camel driver. They have many old gold mines around Quartzsite, and the monument to the Syrian camel driver is very near the highway. We noted a large quantity of azurite and malachite in the rocks making up the monument (no, we did not get a pick and try to get them out). We visited quite a few small roadside shops along the road of no special interest and spent the night in Salome, Arizona.

#### Salome, Arizona

The Sheffler boys owned quite a good deal of property at Salome, and Sheffler's Cafe features the fact that it was here "Where she danced." They also feature the fact that this place was made famous by Dick Wick Hall who ran a feature article in the Saturday Evening Post back in 1925. The famous Salome Bullfrog has also played an important part in the history of Salome, and I quote:

#### THAT SALOME FROG

"I'm SEVEN Years Old and I Cannot Swim

So don't Blame Me for Looking Grim.  
When a Frog has to Carry a Big Canteen  
And Water his Back to Keep it Green  
And Prime Himself if He wants to Cry  
When His Belly gets Burned with Alkali  
Where Grass Grows Brown instead of Green

A Frog Can't Help but Feeling Mean  
I'm an Old Bull Frog—and Dang My Hide  
I Can't Swim Because I've Never Tried."

Of great interest to us at this very, very small town is the famous Sheffler

Aviary built at a cost of around \$65,000. This aviary has birds from all over the world and is free to those who visit the aviary, and it is not commercialized from any standpoint. We admire the spirit of Mr. Sheffler who has as his hobby, that of birds. Shortly after arriving in Salome, we made inquiry if any rockhounds lived around Salome and were quickly informed that one of the best rockhounds in that section of the state lived two miles west of Salome, known as the Desert Gem Shop. We drove out to the Desert Gem Shop where we met Mr. and Mrs. Guy G. Emery. We spent two or three hours at this man's home and shop and salesroom talking rocks.

#### **Guy G. Emery visited**

We found out many things about Mr. Emery. Among those was the fact that he was a very highly educated man. As a matter of fact, he appeared on some of our leading chautauquas as a lecturer and platform entertainer. We were shown every courtesy and received much information from him relative to the type of specimens to be found in his section of the state. We purchased a moss agate paper weight, traded him some fluorescent specimens, and were given a beautiful geode in return for some rocks which we are going to send to him. Mr. Emery had a large amount of Arizona petrified wood, agates, and cutting material of all types. He especially had a large quantity of Montana moss agate and sells beautiful Montana moss agate cabochons and slabs. Mr. Emery is a trustworthy, fair-minded, fair play gentleman, and we hope that he will come to our mineral show and bring an exhibit. After spending the night in Salome, we found the next morning to be very frosty and the air very crisp and were soon on our way toward Wickenburg.

#### **Roy McKay visited**

At Wickenburg we visited the Desert Treasure House of John L. Mansfield. Mr. Mansfield had traded a bedstead and mattress to some rockhound for a large box of mineral specimens. We tried our best to trade him for some vanadium specimens but were unsuccessful. Just a

short distance on down the road from the Desert Treasure House, we visited Roy H. McKay, owner of the Wickenburg Gem and Mineral Dealer. Roy McKay has a beautiful little roadside gem shop, and furthermore, he is rather low-priced on his specimen material. We traded rocks with Roy and bought rocks from Roy. Especially were we proud to secure a beautiful pastel shade specimen of Arizona petrified wood. We found Roy McKay to be very generous and really embarrassed us as we drove away by insisting that he be allowed to give us specimens of his beautiful Arizona fluorescent agate. Much could be said and written about the town of Wickenburg since this is the location of the famous Wickenburg massacre by the Indians.

#### **Double H Gem Cutters visited**

After leaving Wickenburg, we drove steadily into Glendale, about ten miles out of Phoenix. Here at Glendale we visited the Double H Gem Cutters, 904 East Avenue. The Double H Gem Cutters is run by Mr. John W. Hendrickson and his son, and it was here that we saw the great beauty of the Arizona banded agate featured by the Double H Gem Cutters. The Double H Gem Cutters sell their slabs from 20 to 35 cents a square inch, and the remarkable thing about the cutting agate for sale by Mr. Hendrickson is the great beauty of the cabochon. We noted quite a good deal of iridescent quality in the agate, and furthermore, that many different picturesque cabochons were made from the slabs. Mr. Hendrickson is a gentleman from every standpoint and in his dealings with us he was more than fair. We purchased some agate, traded some agate, and frankly, were overwhelmed at the large number of beautiful specimens which he gave to us at the time of our visit. We certainly hope that our mineralogical show will have specimens from the shop of the Double H Gem Cutters. Mr. Hendrickson owns his own agate bed and will in the future be featuring his Arizona banded cutting agate pretty heavily through the various periodicals.

In Phoenix we wanted to visit Mr. A.

L. Flagg, but it was Sunday and we did not bother Mr. Flagg who is President of the Mineral Society in Arizona. We attempted to visit two mineral dealers but they were closed on account of the fact that it was Sunday. We found two dealers had moved to other locations, and again we were confronted with only a box number, and again we made our resolutions to never try to visit a person with just a box number. On the outskirts of Phoenix, at a very small mineral dealer's place (a woman), we purchased and traded for copper specimens of various types.

#### **E. H. Husted visited**

Shortly after leaving Phoenix and passing through the town of Superior, we drove over mountains and encountered a small amount of snow and passed through the town of Miami where we found the gem dealers all closed. We drove on into the town of Globe, Ariz., and spent the night. We enjoyed our visit to Globe at the Agate Shop which specializes in polished agate specimens. This shop is owned by E. H. Husted, a rather newcomer in the mineralogical field. We traded agate with Mr. Husted and purchased an Arizona highway bulletin from him which had a feature article dealing with rocks.

The next morning after spending the night at Globe, we found the air very crisp and were soon on our way toward Coolidge Dam. About nine miles on the other side of Collidge Dam we found out a man by the name of L. K. Davis sold crystal specimens and featured garnets and the fact that he calls himself the "garnet man". We looked at the road which turned off to his place and we thought about how heavily loaded our car was with rocks, and we noted the great boulders in the middle of the road going toward his place, so we gave up and did not attempt to drive to his place. As far as we are concerned he may live one mile or fifty miles from the road. He gave as his address Coolidge Dam. The road turned off to go to his place nine miles from Coolidge Dam, and we doubt seriously that we could have made

the trip to his residence.

#### **James T. Lawyer again visited**

We drove steadily until we reached Deming, New Mexico, where we called on Mr. James T. Lawyer, whose wife we had visited on our way out on the trip. We traded the last of our fluorescent agate to Mr. Lawyer, and again were quite embarrassed with the generosity of this good veteran who is so interested in lapidary work. As previously mentioned, Mr. Lawyer is a mineralogical student at the College of Mines at Socorro and he has worlds of good New Mexico agate for sale. He is not high on the prices and has excellent material for sale. We hope that James T. Lawyer and his nice family will visit us sometime here in Texas.

#### **Safe arrival home**

After leaving Deming we passed through Las Cruces and drove on to El Paso where we spent the night. The next morning we drove steadily until we reached Marathon where we traded rocks with a cafe owner in Marathon. We did not have a chance to stop in Alpine and see our friend Woodard since my good wife was pushing me pretty heavily to get home and see the grandchildren. We reached Del Rio late in the afternoon and spent the night there, calling on the telephone Orville Lee to find out what he was doing in the rock business. Sometime we are going to get Orville Lee to join our Society. After spending the night in Del Rio, a trip on to Austin was made in very fast time, arriving home Christmas Eve tired but happy on account of having a car fairly dragging the ground with rocks.

### **Herbert Percy Whitlock**

#### **(Obituary Notice)**

Herbert Percy Whitlock, 79, curator emeritus of gems and minerals of the American Museum of Natural History, died Sunday, Feb. 22, 1948, at his home, 103 Waverly Place, New York City.

One of the foremost mineralogists of the country and author of numerous papers and books, mineralogy suffers a heavy loss by his death. We hope to print a story of his life in an early issue of *Rocks and Minerals*.

## A DAY AT THE MIRABEL AND SULPHUR BANK MINES

Lake County, California

By HARRIS D. MATHEWSON

Since coming to Berkeley after being discharged from the Navy, to attend the University of California, my wife and I have pretty well explored the mineral resources of this region, especially north of the Bay Area. The recent article in the July, 1947 issue of *Rocks and Minerals* by T. Orchard Lisle, "Twenty Good Mineral Locations in a Forty-Mile Radius," in which he details his experiences of from four to six years ago in the famous Mirabel and Sulphur Bank locations, leads me to believe that perhaps readers would be interested in a further description of a trip to both of these areas in November of 1947.

The town of Calistoga, some 78 miles north of San Francisco, is a trading center, known for its hot springs and geysers, and founded as a watering place by the Mormon leader, Samuel Brannan, in 1859. While this vineyard center of the upper Napa Valley may be reached by several ways, we went by way of Vallejo, Napa, and St. Helena on State Highway 29. This is one of the prettiest areas in California, and goes through a very fertile valley where the chief industry is raising grapes and making wine. We went on a week-day and so were able to stop at Beringer's Winery just north of St. Helena, a town which has fourteen such well-known

wineries. Beringer's Winery has its aging caves and tunnels drilled into solid limestone. The guide says that the limestone absorbs the moisture from the wooden casks of wine and it certainly must be true for the walls are covered by a soft growth which, if encountered unexpectedly, will hand the unwary visitor a profound shock. Our visit was just after they had put all this year's grape juice into temporary storage in huge vats. The particular room we visited, according to the guide, had over a quarter of a million gallons in storage, each vat a shining lacquered monster of twenty or twenty-two thousand gallons. Later, the wine is put into smaller two and three thousand gallon casks and aged for 3 to 5 years. By all means visit one of the wineries of this area if you travel on a week-day.

Three and a half miles beyond St. Helena is another point of interest, the old Bale Mill, built in 1846. The water-wheel is 40 ft. high and is interesting in that the water was run on a sluice to the top of the wheel and its weight drove the wheel, instead of the more common system of a dam and creek.

A few miles beyond St. Helena is Calistoga, mentioned earlier in this article. It has now become a resort town where mudbaths seem to be the chief attraction.



General view of the Sulphur Bank buildings. Long white object in foreground is the hood of the author's car.

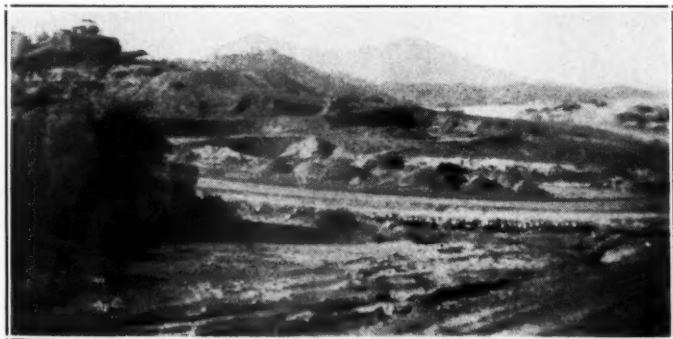


Soon after passing Calistoga, we started the climb up Mount St. Helena. This mountain, while only 4,343 feet high, has as steep a climb as can be found in the country, and in warm weather we found it not unpleasant to stop at one of the eating spots near the summit of the grade, (2,960 ft.), to cool both ourselves and the engine. Once a volcano over 15,000 feet high, the mountain blew its top and is now but a remnant. The narrow road is dangerous because the views over the three counties of Napa, Lake, and Sonoma are so lovely that it is hard to keep one's eyes on the road.

Starting the mileage at the summit of Mount St. Helena, we reached at about 4.8, just past the second bridge on the highway, a place where there was, up to a month or two ago, a small restaurant. The proprietor of this place has since closed up, but he told us that he had found fine chromite on the hills to the left of the road, and his workings can be seen on the slopes of the hill. He showed us a fine specimen and we have since seen a similar specimen of chromite in the University of California Mineral Exhibit.

Just around the bend from this (about 5 miles from St. Helena's summit), we came to the Mirabel properties. We got permission from the supervisor who lives in one of the houses off the road to the left, and he kindly gave us the key to the

locked gate into the Mirabel Mines across the road. We picked up a lot of rock that later turned out to be very beautiful under the Mineralight. There used to be a large pile of crushed rock just west of the mine buildings, but this has been removed recently to provide fill for the highway. The rocks which we found to be best for fluorescence are those of considerable size and weight—say, about six or eight inches on their least dimension—and these are collected to the south of the buildings on the main shaft. These fluorescent rocks were of a very compact variety, sometimes showing cinnabar traces and also whitish dolomite and heavy green serpentine; bands of dolomite and green, almost gemmy opalized material run in veins through them. Some of the rocks carry a stain of yellow oil, or bitumen (hydrocarbon) which fluoresces yellow, or blue when carrying Curtisite in suspension. Even the rocks of this type which do not fluoresce too well will phosphoresce beautifully, especially where the dolomite is in veins. The fluorescence of the dolomite, even with the ordinary black lamp, is especially interesting. However, no mining has been done for several years at Mirabel and the rock piles are pretty well depleted. Some few specimens of cinnabar were found—but these were not crystalline. One might have better luck than we did if more than a half day were spent in the search. At any rate, the place



Sulphur Bank buildings on the left; surface diggings. Pit is just to the right of the picture. Mountain in background (across the lake) is Mt. Konocti.



is ideal for a picnic with springs and creeks to beautify it. We had our portable ice-box with us and were quite happy.

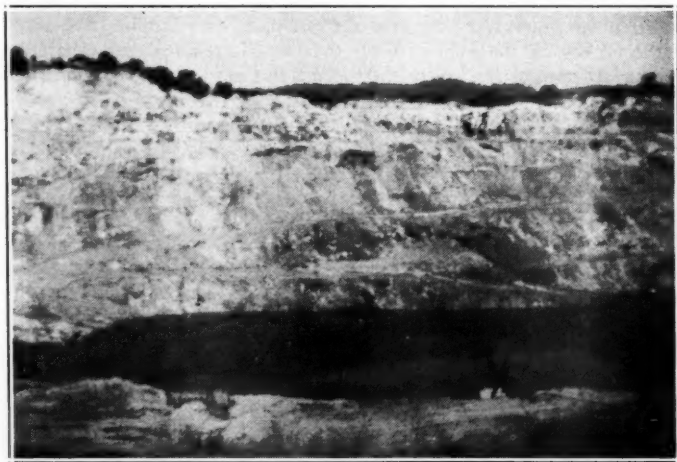
Leaving Mirabel, we reached Middletown at mileage 9.9 from the summit of Mount St. Helena. This is the beginning of State Highway 53, which should be followed to Lower Lake, 25.9, through the scars of the bad fire of this past summer, to Clearlake Highlands, 29.3, thence to the intersection of Highway 20, at 35.6, after which we followed Highway 20 to within a mile and a half of Clear Lake Oaks, where at mileage 37.6 a sign on the left, at the beginning of an orchard, points to Sulphur Bank Mine. We missed the sign going north, and stopped at the first Shell Oil Station on the road into Clear Lake Oaks. The man there gave us explicit directions, and we had no trouble finding the road.

We proceeded down this road to the west about 1.3 miles, crossed a cattle guard, went past signs saying "No Trespassing," and were on the property of the Sulphur Bank Mine. On the slope of the hill nearest Clear Lake are the mills, shops, and the office. The whole hill has been worked over. Mounds and shallow pits lie everywhere, and in between the huge tailings and the main mill-works is

an extensive and deep pit, with a large pool of green water at its bottom. Roads run in every direction around and down into this pit. Looking north, one sees the placid water of Clear Lake with Mt. Konocti rising 3,000 ft. above the water, its shoulder almost cutting the lake in two.

No mining has been done here for two or three years, but the owner, a Mr. Wolbert, has several men working up by the mine buildings making bricks out of the ore. We passed these workers and drove to the offices to ask for permission to prospect a bit. We were given permission but told not to drive down into or towards the pit as the spiraling roads have been undermined by water.

We found the best place of all for specimens was on the north side of the pit, near the top. Here a whole bank was solid sulphur: a white burnt matrix, with small but beautiful crystals ranging from light yellow to almost green. Right over the hill from here was a vein of intensely scarlet cinnabar threading through its matrix, but the matrix was so damp and soft that only small and medium-sized pieces could be obtained. These have to be dried before they can be handled at all. The sulphur specimens too, though



Main pit of the Sulphur Bank diggings; light or power pole in bottom is about 30 feet high—to give idea of scale.



The author's wife, Jannette, picks out a few good specimens at the Sulphur Bank Mine, Nov. 8, 1947. The large "white" rock in the background is almost solid sulphur crystals.

beautiful, must be handled with extreme care. We were disappointed to find that none of our specimens would fluoresce, although some from this area has been found to fluoresce blue.

The pit itself is worth a trip. Going down to the bottom, little springs are seen in all directions, running down to the pool at the bottom, and the hiss and bubble of gas escaping is heard on all

sides; up through the water of the pool itself continual large bubbles rise, and the deserted feeling, with these queer noises all around produce a weird impression.

My wife and I felt that the day was well spent. We had a beautiful trip and came home with the bright prospect of examining some 250 pounds of good-looking sulphur and cinnabar specimens.

### A Correction

Mrs. Lillian Wirsula of Winsted, Conn., has called our attention to several errors in her letter printed in page 98, in the February, 1948, issue. We are reprinting her letter below, with the errors corrected:

### We approve this gift—who else will duplicate it?

Editor R. & M.

After seeing the little item in the December, 1947, issue of *Rocks and Minerals*—"Scientific Books for Finland" (p. 1129), I sent all of my last year's copies of *Rocks and Minerals* to the Finland Legation at Washington, D. C., to be forwarded to the Technical Institute in Finland. I received a nice letter from the Minister for Finland thanking me for

my contribution and interest in the needs of the Institute of Technology and saying that he is certain the publications will be of interest and will be gratefully received.

I am just wondering if *Rocks and Minerals* was ever sent to Finland before.

Mrs. Lillian Wirsula  
Winsted, Conn.

Jan. 27, 1948

### Agate Most Popular with Amateur Cutters

Agate is the most popular mineral with amateur cutters. It is found in practically every state in the Union and in a number of colors or varieties.

Can a nice agate specimen be found in your collection?

## TITANIUM

(Inf. Circular No. 39 (Jan. 1, 1948). Division of Mines, San Francisco, Calif.)

Titanium (Ti) is a lustrous, white, metallic element resembling polished steel. It is harder than quartz and is rather brittle at ordinary temperatures. By heating to redness, the metal can be drawn or forged. Titanium burns in air (above red heat) with emission of brilliant white light and is the only element that will burn vigorously when heated in nitrogen. Other physical properties are atomic weight, 47.90; melting point 1800°C; sp gr, 4.5 at 20°C; and valence, 3 or 4. In both physical and chemical properties titanium resembles cerium, thorium, and zirconium. Like zirconium, titanium is a spark-producing metal particularly when rubbed against iron.

Although titanium is the ninth most abundant element of the earth's crust, it is considered rare because of lack of concentration in any one place. Only two of the many titanium-bearing minerals are abundant enough to be considered ores at the present time. These are ilmenite ( $\text{FeTiO}_3$ ) and rutile ( $\text{TiO}_2$ ).

Ilmenite crystallizes in the rhombohedral division of the hexagonal system but generally occurs in grains or granular aggregates without apparent crystal faces. The mineral is lustrous black and often shows a reddish tinge on fracture surfaces. Cleavage is absent or poorly developed and fractures tend to be conchoidal. Hardness (5-6) and sp gr (4.5-5) are similar to those of magnetite, chromite, and hematite, which resemble ilmenite and may occur similarly. Magnetite is much more magnetic than ilmenite and chromite much less so. Hematite is non-magnetic and has a red streak. Chromite has a brown streak in apposition to magnetite, which has a black streak, and ilmenite, which has a metallic or black streak. Pure ilmenite contains 31.6 percent of titanium.

Rutile has a strong tendency toward development of crystal faces. The crystals are commonly tetragonal prisms vertically lined or "striated." The mineral is distinctly cleavable in two directions. Luster is metallic-adamantine, (diamond-like)

or sub-metallic; hardness is 6-6.5; sp gr is 4.18-4.25; and coloration is commonly red, reddish brown, or reddish black. Most specimens have a light brown streak. In pure form, rutile is 60% titanium.

Both ilmenite and rutile are accessory minerals in plutonic igneous rocks. They may be common in some metamorphic rocks also. Most commercial ilmenite is taken from blacksands of placer deposits derived from breakdown of such rocks. Rutile is not found in California in commercial quantities but is an important source of titanium in Virginia and Norway. In Virginia and adjacent southern states rutile is mined from pegmatite (and related metamorphic) lodes and placers derived from them. At present, California production of ilmenite is confined to one stream placer deposit in Los Angeles County. This is in Sand Canyon in the western San Gabriel Mountains about six miles southeast of Solamint (on Highway 99). Beach placers and lode deposits in the same county have been worked in the past but are now idle. Considerable reserves of ilmenite in black sand occur in placers of the Sierra Nevada and San Gabriel ranges as well as in other parts of California.

California mining practice in connection with titanium has been largely simple surface mechanical removal of alluvial and beach placer material. Few lode deposits have been developed past the exploration stage. Short adits and shallow shafts have been driven on many of the claims for exploration or development purposes. A little ore has been shipped from such workings in past years. Many tons of black sand pass through dredges being operated for gold. Much of this should be saved and stock-piled for future use.

Titanium ore is usually concentrated gravitationally and separated from other heavy mineral associates by electromagnetic or electrostatic means. Some operators wash and screen the ore before concentration and separation. In one case

sea water was utilized for washing purposes.

Ilmenite and titaniferous magnetite are converted to ferrotitanium or ferrocarbon-titanium in electric furnaces, the reducing agent for the former alloy being aluminum, and the latter, carbon. Titanium dioxide is produced from ilmenite and titaniferous magnetite by two different types of treatment, each type having several variations as to chemicals used and procedure. The first type involves fusing the ore with an alkali in an electric furnace, hydrolyzing the melt, and separating the iron and titanium compounds by selective crystallization and introduced precipitants. The second type of treatment involves digestion of the ore in sulfuric acid and hydrolization of the acid solution.

The foremost use of titanium is in pigments. The high opacity or covering power of the white dioxide is utilized not only in pigments but in cosmetics, ceramics, and many other manufactured items. Titanium is important in steel manufacture both as an alloying metal and as a scavenger and deoxidizer. A great many alloys of non-ferrous base and precious metals have appeared on the market in the last decade, and titanium metallurgy is becoming a very important field.

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## BEGINNER'S LUCK

By MRS. DANA B. PUTNAM

Bryant Pond, Maine

I use the word beginners because until two years ago my husband and I didn't know such a hobby as "Mineral Collecting" existed. That is not much to our credit as we have a farm almost in the center of Oxford County, Maine. But let me state that after paying a visit to Mr. Perham at his "Maine Gem Shop" we lost no time in becoming Rockhounds.

This field trip concerns an unusual find at Mt. Mica, Maine, last summer. (1947) It was a beautiful day when the whole world is at its best. We found our way to Mr. Irish's farm where we asked his permission to dig on the dumps. He was most friendly and not only gave us permission but showed us some of his many specimens as well as some beautiful cut gems from the mine. We could have visited all day but prospects of the famous mine made us cut our visit short.

It wasn't long after that we parked our car at the gate and walked the short distance to the mine. After picking our spot and eating our Rockhound lunch, we settled down to an afternoon of fun. Dana was busy in short order carefully sifting the sand and finding small crys-

tals of dark green tourmaline. I picked a spot not far from him (so he could move the heavy ones) and proceeded to move rock. After awhile and no luck, I decided to try another spot. But as human nature demands, I had to pick up just one more. It was way back under as far as I could reach and it felt like the smooth side of a crystal. Asking my good-natured husband to move just one more rock, I had "It".

"It" was the termination of a smoky quartz crystal about four inches in diameter and about four inches tall. I brushed off the dirt and held it in the sunlight. It seemed to have a pink ring around it. Mr. Irish appeared a few minutes later and verified our find as Rose Quartz crystals. They almost circled the large smoky quartz crystal in a single ridge that seemed to grow up and away from the crystal. It seems to call to mind the pictures one sees of the Great Wall of China.

That find has been a challenge to us. There is always something to be found even on the so-called "worked out" dumps.

## FAHEY ON RARE CARBONATES

By CHARLES A. BELZ, Secretary

Philadelphia Mineralogical Society

A specimen in a laboratory of the U. S. Geological Survey may eventually lead to a meeting with the Philadelphia Mineralogical Society. For example, Joseph J. Fahey, Assistant Chief, Section of Geochemistry and Petrology of the U. S. Geological Survey, addressed the Society at its February meeting on the subject of "Some Rare Carbonate Minerals of the Green River Formation of Southwestern Wyoming". This had its beginning all the way back to a drill core sent to the U. S. Geological Survey for analysis. Mineralogical examination revealed the presence of the soda-lime carbonate, Shortite. Soda ash being so very important to our industries, in fact being a veritable bottle neck in the manufacture of glass and soap, Mr. Fahey was sent west to investigate the source of this drill core, which was the Green River formation. Shortite was found everywhere, but of much greater importance from a commercial viewpoint was the apparent abundance of Trona which is of even greater value as a source of soda ash. Exploratory work was undertaken by the Union Pacific, and actual mining operations has begun by other interests.

The Green River formation filled an alluvial plain extending over an area which now embraces parts of Wyoming, Utah, and Colorado. Toward the end of the Mesozoic Period when the Rocky Mountains were pushed up, there was a downward warping in this area, which soon was flooded with water from the torrential rains throughout this watershed. A long period of sedimentation known in the Eocene period followed, during which erosion from the mountain sides began filling up the intermontane lakes, the largest of which is known as the Gosiute Lake. The presence of sting-ray fossils indicates that during this period at least there was an outlet to the sea. Fossil plants suggest a sub-tropical climate, somewhat similar to the present day climate of Alabama.

After some two million years of such deposition, outlet to the sea was cut off, and Gosiute Lake became a Dead Sea, like the Great Salt Lake of Utah. The only loss of water was that due to evaporation, with a progressive concentration of the dissolved salts. A tremendous variety of living organisms of foraminifera and slimes, monocellular organisms fed those of a higher order, and they in turn were preyed upon by more complex fauna and flora, which on completion of their life cycles, sank to the bottom to dissolution and decay. In time the waters became so fetid that even bacteria could not exist, and whatever fell to the bottom became preserved in the shales to record indelibly a history of the times.

Mr. Fahey showed slides of fossil fish in an almost perfect state of preservation. Judging by the extraordinary abundance of such fossils in one part of the formation ranging in size up to 3½ feet long, it must be inferred that millions of fish were trapped by some fall of volcanic ash, and perished. Blocks of shale can be picked up almost at random, split and the skeleton of a fish brought in bold relief by picking out the softer argillaceous material between the bones. Some plaques contain 5 to 6 such fossils. One slide showed a specimen of a fly unbelievably perfect, even to the delicate and fragile tracery of the wing structure. Another micro-photograph showed perfectly the complex lens structure of part of an eye.

The Green River sediments contain a great mass of oil shales reaching a thickness of 4800 feet. Distinctive varving provides a fairly reliable means for estimating their age. Each varve is composed of two thin strata of light and dark material of varying thickness. The regularity in deposition as evidenced by these alternating fine grained laminae connote a periodicity in their formation which must certainly be seasonal, and quite probably annual in its character. These laminae are easy to count in polished specimens,—

in the finer sandstones they average about 250 to a foot, but in the richer oil shales of this formation, they have been observed as fine as 8200 to the foot. If the periodicity of the varves is annual as the growth rings in a tree, it would have taken 5 to 8 million years to build up this thickness.

The suite of minerals of the Green River formation include the following: Shortite, Trona, Pirssonite, Northupite, Gaylussite, Bromlite, Bradleyite. Of these the carbonate-bicarbonate of soda, Trona, is present in sufficient quantity to be of commercial importance. Production from this area is competitive as far east as Chicago, and also on the West Coast and in Texas.

The anhydrous bicarbonate of soda, Nacholite, also occurs in this formation. The differences between Nacholite and Trona are not easily discernible, with a hand lens, but positive test can be made by determining the birefringence, Nacholite being very high at .206 as compared to Trona which is .128.

A discussion of the carbonates of the Green River deposit would not do justice to the formation without at least mentioning a few of the silicates, notably the hydrous sodium boro-silicate, Searlesite, first found at Searles Lake, San Bernardino, Calif. While euhedral crystals had been reported measuring 2 to 3 mm. along the c-axis, individual crystals of tabular habit were found at Green River measuring centimeters across instead of mm.

Mr. Fahey described a new silicate first identified in this formation, a discovery at the John Hay well. The new find was named Loughlinite after a previous head of the Geologic Branch of the U. S. Geological Survey. It is indistinguishable from asbestos with a hand lens, but a substantial difference was observed in the powder pattern. It looks just like some form of asbestos, and fluffs out like so much cotton. The bundles of fibres are so minute and so interwoven that it is

most difficult to break them fine enough to free them from the sodium carbonate and sodium chloride with which they are intimately associated.

The richer oil shales assayed 70 gallons per ton, but to discourage any undue optimism concerning a quick solution to the oil shortage, there is actually no oil in the oil shale. The oil shale does however contain a type of organic matter which by pyrosynthesis can be broken down to form oil. This process is a comparatively expensive one, which as yet cannot compete with gusher oil. However, the oil shales of the west are a potential source of oil and await merely the discovery of some process of economical conversion. By way of comparison, Mr. Fahey stated that the Green River shales alone possess a b.t.u. value equal to that of all the known deposits of coal in the entire state of Pennsylvania. While such statistics may be no great immediate consolation to us as we watch the gauge on our oil tanks racing toward "empty", but they are reassuring to the extent that there are reserves of power somewhat nearer than the atomic pile. There is further reassurance in the knowledge that nothing however slight is overlooked by the Geological Survey in its great work to discover and catalog our mineral resources.

### Mauna Kea, Hawaii

#### World's Largest Island Mountain

Mauna Kea, an extinct volcano in the Hawaiian Islands, is the highest island mountain in the world. In addition to this, it is also one of the world's highest mountains because it rises almost 14,000 feet (13,805 feet) above sea level and there is about 18,000 feet of the mountain below sea level. Although its upper slopes are covered with snow for the greater part of the year, coffee is grown on its lower slopes.

Mauna Kea is in the northern part of the Island of Hawaii, the largest island of the group.

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## WORLD NEWS ON MINERAL OCCURRENCES

(Bureau of Mines Mineral Trade Notes, November, 1947)

### I. METALS ANTIMONY

SPAIN.—Spanish output of antimony concentrates in 1946 totaled 314 metric tons, 263 from Cuidad Real, 2 from Jaen, and 49 from Lugo Provinces; and 399 tons of metal, 57 from Murcia and 342 from Viscaya Provinces.

(Third Secretary of Embassy Robert L. Yost, Madrid, and Estadística Minera y Metalurgica de Espana, 1946.)

### BAUXITE

BRITISH GUIANA.—The Permanente Metals Corp. has applied for exclusive permission to explore approximately 825,000 acres of Crown Land in the Essequibo River District. The area is situated between the lower Essequibo River and the Manawarin River beginning at the mouth of the Supenaam River, thence in a straight line in a northwesterly direction to the confluence of the Manawarin and Moruka Rivers, thence along the Manawarin River to its southwestern headwaters, thence in a straight line in a southeasterly direction of Black Creek, a tributary of Groete Creek, at a point about 4 miles above its mouth, thence along Black Creek and Groete Creek to the Essequibo River, thence along the left bank of the Essequibo River to the starting point.

(Vice Consul Everette L. Damron, Georgetown.)

### BISMUTH

SPAIN.—Bismuth concentrates produced in Spain in 1946 totaled 119 metric tons and bismuth metal 14 tons. In the first 9 months of 1947, 33 tons of concentrates were produced. No data are available on the metal output in 1947.

(Third Secretary of Embassy Robert L. Yost, Madrid, and Estadística Minera y Metalurgica de Espana, 1946.)

### CHROMITE

PHILIPPINE REPUBLIC.—The Consolidated Mines property at Masinloc, operated by Benguet Consolidated, is reported to be producing 20,000 tons of refractory chromite monthly valued at \$9.50 a ton f.o.b. Shipments of metallurgi-

cal grade chromite are expected from Cagayan de Misamis, northern Mindanao, in 1948.

(Commercial Attaché J. Bartlett Richards, Manila.)

### COPPER

PHILIPPINE REPUBLIC.—The Lepanto Consolidated mine has shipped about 7,800 tons of copper concentrates abandoned on its property by the Japanese who are said to have produced about 180,000 tons during the occupation. About 1,000 tons remain to be shipped. These exports are financing the reconstruction of the property, which is expected to begin production of copper concentrates at the 500-ton-daily-capacity mill in the spring of 1948.

(Commercial Attaché J. Bartlett Richards, Manila.)

### NICKEL-CHROME

SPAIN.—The 147 metric tons of nickel-chrome ore produced in Spain during 1946 was from the Carratraca mine in Malaga Province. This compares with an output of 560 tons in 1942, 680 in 1943, 516 in 1944, and 275 in 1945.

(Estadística Minera y Metalurgica de Espana, 1946.)

### PLATINUM

UNION OF SOUTH AFRICA.—Platinum output in the Union during the first 9 months of 1947 consisted of 53,919 ounces of platinum metals and 935 short tons of matte (containing approximately 443 ounces of platinum metals and gold, 28 percent copper, and 45 percent nickel per ton), compared with 57,091 ounces of platinum metals and 868 tons of matte in the first 9 months of 1946.

(Minerals Attaché William O. Vanderburg, Pretoria.)

### TUNGSTEN

SWEDEN.—The Geological Department of the Uppsala University is investigating the recently discovered wolfram deposits at Norra Karr, Granna.

### II. INDUSTRIAL MINERALS ANDALUSITE

UNION OF SOUTH AFRICA.—The Mines Department records show that in



the first 9 months of 1947, 8,811 short tons of andalusite was produced, compared with 2,446 in the first 9 months of 1946.

(Minerals Attaché William O. Vanderburg, Pretoria.)

#### **CORUNDUM**

**UNION OF SOUTH AFRICA.**—In the first 9 months of 1947, output of crystal corundum totaled 401 short tons and corundum concentrates 1,068 tons, compared with 459 tons of crystal and 996 tons of concentrates in the first 9 months of 1946.

(Minerals Attaché William O. Vanderburg, Pretoria.)

#### **DIAMONDS**

**BELGIAN CONGO.**—In the first half of 1947, output of industrial diamonds was 2,339,073 carats, and gem diamonds totaled 254,175 carats.

(Vice Consul Lewis Dean Brown, Leopoldville.)

**UNION OF SOUTH AFRICA.**—There has been a marked improvement in the diamond market owing to increased buying in the United States (gem and industrial stones) and India (gem stones). Buying in India no doubt is connected with political uncertainties, which traditionally cause hoarding and the suspension of import licenses for gold and silver.

The Financial Times of London states that the uncertainty about the future of sterling and the value of diamonds in the United States as an inflation hedge are among the reasons for the present strong demand for diamonds.

#### **EMERALDS**

**UNION OF SOUTH AFRICA.**—Although 7,753 carats of emeralds were produced in the first 9 months of 1947 (compared with 9,768 carats in the first 9 months of 1946), none were sold locally or exported, according to preliminary figures of the Department of Mines.

(Minerals Attaché William O. Vanderburg, Pretoria.)

#### **FLUORSPAR**

**SPAIN.**—Fluorspar output in Spain during 1946 totaled 8,712 metric tons—

1,400 from Barcelona, 801 from Cordoba, 2,230 from Gerona, and 4,281 from Oviedo Provinces. In the first 9 months of 1947, an estimated 12,687 tons were produced.

(Third Secretary of Embassy Robert L. Yost, Madrid, and Estadística Minera y Metalurgica de Espana, 1946.)

#### **GEMSTONES**

**CEYLON.**—According to the Mining Journal of London, the gem situation is as follows:

Those engaged in the gem trade of Ceylon have failed to reach an agreement despite repeated efforts to unite them to protect their interests. It is therefore, suggested that the time has come for the Government to take action to restore the reputation which Ceylon has held from time immemorial for precious stones—a reputation which has been lost in recent years as a result of reprehensible trade practices. During the war there was great demand for Ceylon gems, especially from American and British servicemen who have been cheated by disreputable sellers palming off synthetic gems or pieces of glass for genuine gems. In 1919 a special committee was appointed by the Government to investigate these and other matters connected with the gem industry in the island. The Committee issued its report in 1921, and among the recommendations were that trained lapidarists should be brought to Ceylon to teach the principles of scientific gem cutting to the local trade and the establishment of a Government Sales Room for the periodical sale of gems to be supervised by an officer of the Mines Department. The Government has so far taken no action on the recommendations of the Committee, but in 1937 they contemplated the setting up of a Government Sales Room, and a subcommittee was appointed to inquire into the marketing and cutting of Ceylon gems. This subcommittee published its report in 1939, making several important recommendations, but the war intervened and nothing was done about it. Recently, however, some suggestions have been made to the Government re-

garding the improvement of the industry, and one of these is that uncut stones found in Ceylon be sent to a foreign country like Switzerland for cutting. Another is that an expert should be brought to Ceylon either from England or Amsterdam to give instruction to local craftsmen. These are being considered by the new Minister of Industries, and early steps are expected to be taken to put the gem industry of the island on a sound and reputable basis.

### ZIRCONS

**FRENCH INDOCHINA.**—The three zircon-mining centers of Bokeo, Pailin, and Cheon-Ksam (Cambodia) are believed to be flourishing. Mines are operated mainly by Burmese firms. The mines are so close to the border of Siam that control over the production by French authorities at present is impossible.

Little material is needed for exploitation, as the crystals and fragments are found almost on the surface. Cutting and thermic treatment in crude ovens are done on the spot.

Current annual production has been estimated at worth about one million piastres (\$140,400). A 4.6 carat deep-blue stone from Pailin was valued at 4,600 piastres (\$665), and a small 0.30 carat white stone was valued at 3.60 piastres (\$0.50).

The zircon production in Cambodia is reported to be large.  
(Vice Consul Albert W. Stoffel, Saigon.)

### III. MISCELLANEOUS INFORMATION JAPAN

**Statistical reporting.**—According to the United States Political Adviser for Japan, Tokyo, an announcement has been made by this headquarters on the creation of a statistical section in the Mining Bureau of the Japanese Ministry of Commerce and Industry. Statistics formerly supplied by private business associations were neither complete nor accurate. As the associations are now being dissolved under provisions of the Industrial Decentralization Law, the statistical func-

tions which they perform will be taken over by the Mining Bureau.

### SPANISH WEST AFRICA

**Legislation—minerals.**—All mineral substances in classification "B" of the new mining regulations for Spanish West Africa have been reserved to the Spanish State by an order of September 9, 1947, published in the Official Bulletin of September 12, 1947. This action means that the State may deny the right of any person or corporation to apply for permission to investigate deposits of minerals so classified or to engage in the actual exploitation of such deposits within the territories of Rio de Ore and Sidi Ifni.

Substances included in classification "B" are: Deposits of metalliferous materials, natural gases, solid, liquid, and gaseous fuels; graphite and carbonaceous and bituminous substances; peat; solid or dissolved rock salt; iron ores and others; pyritic earths, refractory and decolorant earths; metalliferous placers, sands, and alluvium; calcareous phosphates; dolomites, barium sulfate, fluorspar, and Iceland spar; steatite, talc, kaolin, feldspar; mica, asbestos, pumice stone, bauxite, magnesite, giobertite, and alunite; pure silicon and its variations; alkalies, alkaline earths, magnesium compounds, and radioactive substances, solid or dissolved in water; copperas, sulfur, garnets, and other mineral substances not included in classification "A" of the new mining regulations.

The present regulation is provisional and will be in force only until such time as a permanent reservation may be published.

The present order is in line with the policy of the Government of reserving to itself deposits considered to be of special interest to the Spanish economy, thus attempting to provide for an orderly exploitation of the country's mineral resources and for the preservation of reserves that might be exploited more profitably at some future time.

(Third Secretary of Embassy Robert L. Yost, Madrid.)

## THE GEOLOGY OF LOWER MILFORD TOWNSHIP LEHIGH COUNTY, PA. (Part 2)

By CHARLES W. BROWN

Muhlenberg College, Allentown, Penn.

### \* \* \* LITHOLOGY \* \* \*

#### **Pochuck Gneiss**

Although there is an abundance of this basic gneiss to the northwest and northeast of our area, we find that it occurs in only a few spots in the area itself. However, there is sufficient evidence that the formation was of considerable extent at one time, as the assimilation product caused by the Byram intruding the Pochuck is found throughout the Reading Hills of the area under survey. We have mapped it as Byram, but in New Jersey this intermediate stage is mapped as a separate gneiss known as Losee Gneiss.

Most of these small "pockets" of Pochuck have been mined-out for the iron that they contain. This situation exists on the crest of the mountain southeast of Dillingerville.

A gneissic structure prevails in the Pochuck due to the orientation of hornblende and biotite grains in a parallel plane, or to a given direction. This gneissic structure is accentuated where the Byram has invaded the formation, and there is an alternation of light and dark bands. In the field the Pochuck appears as a dark green or greenish-black rock with a ferruginous weathering characteristic. In the outcrop structural weaknesses or directions do not appear noticeable, and if the rock has been subjected to silicification, as has much of the material, the tendency to break along gneissic directions is almost, if not completely lacking.

Variations from the usual hornblende-andesine composition occur, and we find a biotite-andesine facies as well as a hornblende-pyroxene-andesine facies. These facies grade into each other, and they all grade into types in which the Byram granitic material dominates.

D. M. Fraser has analyzed the Pochuck extensively and found the following conditions to exist:

"In thin-section the Pochuck gneiss is found to be more variable than one would

expect from an examination of the hand specimens in the field. Megascopically, the material is characteristically a speckled granulose type of rock possessing a rude structural alignment. The minerals observed in the hand specimens are recognized as hornblende and plagioclase feldspar. In addition, certain phases contain biotite with or without hornblende and (or) pyroxene. Some phases contain rather abundant hornblende and pyroxene crystals. Under the microscope the plagioclase varies from oligoclase to labradorite in composition. The accessory minerals are apatite, magnetite, titanite, zircon and occasional other grains of much less abundance. The material commonly alters by the development of hornblende from pyroxene and the breaking down of plagioclase to form saussurite. Epidotization is common where silicification of the Pochuck is prominent."

#### **Byram granite gneiss**

As one might expect, having observed the great extent of this granitic gneiss, there is a tremendous variation in form and composition of the Byram gneiss. In Lower Milford township this rock type makes up the greater part of the Reading Hills. It is well exposed in road cuts, stream valleys and occurs as float in many fields and woods. Only small patches of the other pre-Cambrian formations occur in the Byram as it forms the main body of the mountain range, with small Paleozoic sandstone and limestone valleys breaking the continuity of the structure.

Upon observing the various hand specimens, we find that the variety is unlimited. This is due to the fact that the Byram assimilated a great part of the pre-existing formations into which it was intruded—namely, the Franklin, Moravian Heights and Pochuck.

The normal texture is average granitic, but varies from fine to coarse granitic facies. The most common type is the one

that possesses a rude streaking, or an indistinct discontinuous banded appearance. This is due partially to the orientation of the dark minerals along the line of flow as the mass consolidated, and in other localities it is due to remnants of bands in older formations which the Byram has assimilated. In many places the Byram shows well developed joint sets.

According to Fraser, the petrology and petrography of the Byram is as follows:

"As has been stated, the Byram varies considerably in its composition. The minerals of the facies that is thought to represent the pure type are quartz, microcline, soda microcline, microclasperthite, orthoclase and small amounts of apatite and magnetite. Other types of the Byram range from the pure original material into facies which include abundant hornblende and plagioclase feldspar commonly of oligoclase or oligoclase-andesine composition. In addition, varieties containing biotite and hornblende with plagioclase of the more sodic type are found. Magnetite is more abundant in the rocks containing hornblende and often the percentage of apatite also increases. The pegmatic material associated with the Byram gneiss is typically a quartz, orthoclase or microcline rock."

#### The Hardyston Formation

Confining ourselves to the immediate area under discussion, namely Lower Milford township, we find the Hardyston formation being made up of quite a great variety of different rock types and associated mineralization. It varies more so than any other of the sedimentary formations that the author has had contact with, and the formation presents many interesting problems along lithologic lines. Contrary to general conception, the Hardyston Formation is not merely composed of a quartzite. It is made up of conglomerates, quartzites and sandstones. Jasper of several varieties is prolific in the formation with associated mineralization.

At or near the base of the formation, we find a conglomerate occurring, which is composed of well-rounded pebbles of quartz, often stained wine-red. The ma-

trix for the pebbles is usually quite dark, and contains some epidote and chlorite. According to B. L. Miller, the formation does not exceed eight to ten feet in thickness. In Lower Milford township there is no evidence in the form of an outcrop to contradict the statement and only scattered occurrences of the conglomerate are found.

Due to the manner in which the quartzites and sandstones grade into each other it is found most satisfactory to discuss them together rather than separately. Primarily, there are two divisions into which the sandstones and quartzites fall, the non-arkosic and the arkosic. The non-arkosic was not in evidence in the field in Lower Milford, but where found in other parts of Lehigh County, it is commonly blue-grey, grey or white. On the other hand, the arkosic variety, which is the common type found in the field, is buff or salmon colored. Both varieties of the quartzites and sandstones are fairly fine-grained and homogeneous as seen in the hand specimens, and when struck with a hammer, it breaks almost like glass producing a conchoidal fracture, the pebbles and sand grains not being readily discernible with the naked eye. The feldspar in the rock is sometimes fresh, but mostly it is altered to kaolin or sericite. Microcline is the predominant feldspar present with soda microcline and microclasperthite also occurring. These minerals show alteration to sericite, and euhedral grains of pyrite are disseminated through most specimens along with occasional grains of zircon occurring in the sericitic matrix.

Upon examination under the magnifying scope, the quartzite reveals white quartz grains and kaolin, both of which are stained by secondary hematite and limonite. Some of the quartz is granular, but the main body is massive with the fracture plane passing through the grains, giving the fragments a smooth face. Fine jointing is evident in the numerous outcrops and quarries that dot Lower Milford township. "Photomicrographs of the Hardyston quartzite show extensive sericitization of the cementing material

and of the feldspar grains. This indicates the action of hydrothermal solutions which are thought to have been introduced from some igneous source not now exposed at the surface but of post-Hardyston age."

Jasper occurs quite commonly with the Hardyston formation throughout the area and it is generally conceded that it is part of the formation itself. *How* it occurs is another question and there are several explanations which are worthy of consideration, as they both "hold water" so to speak. B. L. Miller, D. M. Fraser, P. B. Myers and R. D. Butler have done extensive research on the jasper and chert in the Hardyston, and their results are quite plausible.

In color, the jasper of the Hardyston varies from taffy-yellow to dark brown, or red. In the Hardyston belt between Chestnut Hill and Limeport in the northern corner of the township, jasper of these varieties is found in great abundance in the field. For the most part, the mineralization is drusy quartz, lining pockets in the jasper and also occurring in a mammillary form. The jasper itself is fine-grained, has a satin-like luster when very fine and a fine sandy surface when coarse. The fracture varies from perfect conchoidal to rough and often occurs as a breccia which has been re-cemented by silica in the form of chalcedony and quartz. In the field, the association between the jasper and iron phases of the Hardyston is quite noticeable, but the jasper does not occur along any particular horizon, nor does it persist along the strike for any great distance.

Miller has found evidence of the formation of jasper and ferruginous chert by the complete replacement and reorganization of the quartzite in the field about one and three-quarters miles north of Limeport. The reaction to polarized light in thin sections gives evidence that the jasper is of secondary replacement rather than of primary disposition. In parts the quartzite has been wholly replaced, and in others, it has been only partially replaced. The jasper occurs as pseudomorphs in some of these specimens.

Although there is a shaley member to this series, it does not occur in Lower Milford township, and, therefore, will not be discussed other than by way of mentioning that the exposure of a calcareous shale in the bed of a brook near the old Thatcher Mine east of Stewartsville, N. J., places this shale in the upper part of the Hardyston. This perhaps explains the origin of the clay matrix which surrounds some of the limonite deposits in the Hardyston, as the siliceous members of the formation could not have supplied the clay in such quantities as it occurs.

Pinite, a soft dense light-green rock, that occurs at the base of the Hardyston between Fountain Hill and Allentown and is supposed to be a metamorphosed soil, does not prove to be present in Lower Milford. However, the contact between the pre-Cambrian gneisses and the Hardyston is so hidden by talus, etc., that the pinite may or may not be present. In the one or two places that the contact is exposed in the vicinity of Hosensack, the author was not able to find evidence of pinite occurring.

The fossil record yet described in the Hardyston occurs in the arkosic quartzitic phase. The only feature that indicates marine life is "*Scolithus linearis*", or "worm borings". The tremendous number of tubes makes it a bit difficult to believe that they could have been formed by worms and then filled uniformly with a different sand. However, the worm burrow theory is the only one that seems plausible.

#### The Tomstown Formation

Perhaps the greatest stumbling block to students working with pre-Cambrian and Paleozoic rocks is discriminating between the two Cambrian limestones. In some localities, this problem is of little consequence, but in a locality where there are few and confined outcrops, this presents quite a problem due to the similarity of the formations.

The Tomstown formation, which is conceded to be the older of the two limestones, is composed almost entirely of dolomitic limestones. Several types have

been recognized. The most common is a thin-bedded, high magnesian, impure limestone with individual beds less than one foot thick. This variety passes into a more argillaceous type containing abundant sericite, which in turn passes into a true sericitic shale in which there are practically no carbonates. Although these shale phases have been noted to be up to ten feet in thickness, they usually don't exceed a foot in thickness. All of these thin-bedded varieties weather into thin fragments, and are conspicuous in the surface soil or sub-soil.

A massive dense dolomitic phase also prevails in which the beds vary upwards of ten feet. However, this also exhibits thin fragments upon weathering.

Due to the complexity of the structure in the area, no guide stratum has been recognized, and variations occur within the beds frequently and abruptly.

Earth movements have shattered the

formation in all localities, and the fissures formed are filled with quartz veins that criss-cross in intricate patterns. Flint occurs in nodules along the bedding planes, and it is thought that it is a result of the replacement of the dolomitic limestones by ground waters.

The Tomstown limestone varies in color from a dark steel-blue to a dirty yellow, and upon weathering, it turns buff to chalky white. Oolites, edgewise conglomerates, ordinary limestone conglomerates, cross-bedding and ripple marks occur as local phenomena and all point to a shallow water origin.

The criteria used by the author in the field for recognizing the Tomstown are its shaley characteristics, silicousness and negative reaction to HCl. However, a calcareous facies was found in the Hosensack Valley which reacted strongly to HCl, but was still characteristically shaley.

(To be continued)

## BIBLIOGRAPHICAL NOTES

*Jewelry Designs and Suggestions:* by Arthur and Lucille Sanger.

The designs and suggestions presented in this booklet have been prepared chiefly for the amateur cutter. Rings, bracelets, lapel pins, pendants, earrings, belt buckles, and brooches are featured, which can be set with agate, amethyst, jade, jasper, labradorite, malachite, obsidian, rhodonite, and other stones.

Altogether 38 designs, covering 10 pages, are featured in large drawings. This valuable and timely booklet sells for 60 cents and can be obtained from the authors, Arthur and Lucille, Sanger, 1922 Newport Ave., Chicago 13, Ill.

*Gem Exchange Catalog:* The Gem Exchange, of Bayfield, Colo., has just released its 1948 (Tenth Anniversary) price list. This new list of 20 pages covers gem cutting materials and supplies. The minerals are arranged by states and countries.

*Mineral Industry Map of Ohio:*

The Geological Survey of Ohio announces the publication of a new "Mineral Industry Map of Ohio", by G. W. White and G. C. Gams, Columbus, 1947. It is 32" by 40" in size, colored, scale 1" equals 8 miles. Price 50 cents plus 2 cents tax in Ohio.

Coal mines, limestone quarries ceramic plants, salt operations, sand and gravel pits, gypsum

mines and other mineral industry operations are shown in color and by number. The numbers for each operation refer to those in "Annual Coal Report and Nonmetallic Report, with Directories of Reporting Firms for 1946" of the Division of Labor Statistics, Department of Industrial Relations, copy of which is included with the map. Oil and gas fields are not shown.

*Geologic Map of Holmes County, Ohio:*

The Geological Survey of Ohio announces the publication of another map, the "Geologic Map of Holmes County, Ohio", by George W. White, Columbus, 1947. It is 16 1-2" by 31 1-2" in size, colored, scale 1 1-8" equals 1 mile. Price 50 cents plus 2 cents tax in Ohio.

This map shows the areas of the county underlain by the Logan formation of the Mississippian System and the Pottsville and Allegheny formations of the Pennsylvanian System. The outcrops of the Lower Kittanning coal and the Middle Kittanning coal are also shown. The average geologic section for the county appears in color in the right margin.

The map will be followed by a geologic bulletin by Dr. White on Holmes County in the near future.

Both maps are for sale by the Geological Survey of Ohio, Orton Hall, Ohio State University, Columbus 10, Ohio.



## CLUB AND SOCIETY NOTES

**ATTENTION SECRETARIES**—If you want your reports to appear in the June issue, they must reach us by May 12th—the Editor.

### 7th Annual Science Congress

The Seventh Annual Science Congress, in which two hundred high schools in Central New York area, are asked to participate, will be held at Hartwick College, Oneonta, N. Y., on May 1, 1948. The day will be set aside as Science Day throughout the city.

As a result of the last six years' competition, the project has received much recognition for its valuable work in the science field.

The Oneonta Science Congress, one of the first organized in the United States, affords an excellent opportunity for the young scientists in the area to exchange ideas and achieve recognition for outstanding work.

Plans are under way to bring to the Congress a prominent scientist, who will talk at the Science Congress banquet which will be held in the evening for the benefit of the winners of the competition and for the distinguished guests. Last year Dr. Sumner, the Nobel Prize winner for synthetic enzymes, spoke on his trip to Sweden.

Prizes will be awarded to individuals and group entries in the field of chemistry, physics, geology, biology and photography. International Business Machines, Ward's Natural Science Establishment, Lederle Laboratories, Ansco, Hartwick College and others share in donating the prizes. Scholarships to Hartwick are the top awards. In addition there are science books, magazines, and apparatus for section prizes.

On display in the college buildings will be exhibits from various industrial organizations as well as from the science departments of the College.

### Cherokee Gem and Mineral Club

February 13 was the fourth meeting of the Cherokee Gem and Mineral Club, which was organized November 12, 1947.

Mr. and Mrs. Lee Reeves showed colored slides of the January rock hunt at the dredger piles outside Oroville. They promise to make pictures of the rock hunt scheduled for February 29.

Club meetings are held on the 2nd Friday of each month, at the Cherokee School House, Cherokee, Calif., and public card parties and auctions are held every month. All funds are being banked against the time when the club can purchase its own cutting and polishing equipment and portable mineral light.

Officers are as follows: President, Eleanor Barney; Vice-President, Florence DeLong; Secretary, Rose Churchman; Treasurer, Oliver Truex.

Adeline B. Rankin  
Route 1, Box 131A  
Oroville, California

### Napa Valley Rock and Gem Club

One year ago fifteen people, who thought a piece of chert was a "pretty rock" and a sparkling piece of quartz something to gasp over, got together and the Napa Valley Rock and Gem Club was born. Enthusiasm made up for lack of knowledge, new members were attracted, and the club stumbled happily along until at the close of the year, membership has doubled, some seven families have acquired lapidary equipment and are turning out creditable work, and other equipment has been ordered by other members so the "working members" should be 100 percent in a short time.

New members added from time to time have given generously of time and knowledge and for the coming year a highly educational program has been planned.

The club meets the second and fourth Tuesdays of each month at 1840 Brown Street. Visitors are urged to attend all meetings and rockhound visitors are invited to contact Napa rockhounds at any time.

Following are the officers for the coming year: Neal C. Gardner, president; Erwin Kron, first vice-president; W. F. Dorward, 2nd vice-president; Mrs. Neal Gardner, secretary-treasurer; and Mrs. Frank Level, publicity. Information as to club activities can be received at any time by contacting the Gardner home, 1920 Stockton Street, or the Level home, 370 Cross Street, Napa, California.

### Oxford County Mineral & Gem Association (Rumford, Maine)

The first meeting of the Oxford County Mineral and Gem Association was held at the home of Dana P. Putnam, Rumford Corner, Maine, on March 2nd, 1948. Eleven true rockhounds braved a snowstorm to get the meeting started. Meetings are to be held on the first Monday of each month.

Mr. Stanley I. Perham, of the Maine Mineral Store, told the members of the book he was compiling on the minerals of Maine. He asked for any authentic information on the subject anyone may have knowledge of. Along with the book, he is getting together a library on Maine minerals. His hobby offers the members a wonderful opportunity to get acquainted with the minerals of our state. He has the members' whole-hearted support and best wishes.

Much enthusiasm was shown by those present and high expectations are in order for the future of this Association.

Dorothy C. Putnam, Acting Sec.  
RFD 1, Bryant Pond, Me.

## Mineralogical Society of So. California

Dr. D. F. Hewett, noted author of a number of papers on geology and mineralogy and a member of the U. S. Geological Survey, spoke at the March meeting of the Mineralogical Society of Southern Calif., on the "Discovery of the Vanadium Mines of Peru".

Dr. Hewett described the chemistry of Vanadium as being both unusual and interesting. It was first discovered in 1801 by Del Rio who was examining lead ores from Zimapan, Mexico. It has five valences, and being thus pentavalent is subject to change—oxidizing or reducing with only slight changes in the earth's crust. In the higher states of oxidation it may be yellow, orange, or red in color, while lower states of oxidation show colors of blue or green.

In 1905 there were only about twelve Vanadium minerals known. With the opening of the mine at Mina Ragra, Peru, in 1906, seven new vanadium minerals and three others not vanadium-bearing were discovered. Notable among these, of course, is Hewettite, named for Dr. Hewett. The last thirty years have added about ten more such minerals so that now about thirty vanadium minerals are known.

The first use of Vanadium was in connection with the dyeing industry. As of 1905 the principal known sources of Vanadium were the lead vanadates from Zafra in Spain and the iron slags of France. Then France, England, and Germany began using vanadium more or less experimentally in connection with steel. In the United States, about 1910, ores of southwestern Colorado where Carnotite had been discovered earlier, began to be treated for Uranium and Radium. Quite an extensive source of Vanadium was discovered as a result and that field now supplies about one-half of our domestic need. The rest comes from Peru.

Dr. Hewett's story of the discovery of Vanadium in Peru includes a number of remarkable coincidences. In 1905, employed as a mining engineer, Dr. Hewett met a Peruvian, Emilano Llona, who was here in the States trying to sell some vanadium deposits in Peru. According to Llona, these deposits were a bed of coal the ash of which contained from 10 to 20% vanadium oxide. The material he presented was tested and the presence of vanadium as he claimed proved. Then occurred the first of a series of coincidences. A similar material was brought in—supposedly coal—from Oklahoma. This material also tested showed the same presence of vanadium as did the Peruvian sample.

Dr. Hewett immediately went out to the Oklahoma location to investigate this vanadium-bearing "coal". A study of this deposit soon showed that it was not coal but rather a vanadium-bearing asphalt or asphaltite. Later an examination of the Peruvian deposit proved to be the same type of formation. And then occurred the second remarkable coincidence.

After his examination of the Peruvian deposit, Dr. Hewett had determined that although the deposit was more extensive than that in Oklahoma and the ash richer in vanadium, still it was not extensive enough on which to found an industry. Just as he was about ready to leave to return to the States, a material was brought in that contained 20% vanadium. Reservations for the return trip were immediately canceled in the interest in this new discovery.

It seems that this important fine-grained greenish black material had been brought in by one of the herders of llamas and sheep who had been instructed to look out for traces of coal in the region since coal for smelting purposes was greatly needed. And it had been brought in just in time to be brought to Dr. Hewett's attention before he left Peru. Senor Fernandez, mine operator and owner of the locality where this new material was found, was reluctant to show the deposit but was finally persuaded to do so.

The route to the mine led ten miles south from Cerro de Pasco to Huarauaca and then on across the high flat barren country some 14,000 feet high to Quisque and on to the deposit itself, Mina Ragra, near the crest of the cordillera at 16,000 feet. Here the earth, sparsely covered with grass, was impregnated with minerals that showed colors from brick-red to olive green. Dr. Hewett immediately recognized that all the area underlain by this unusual color contained quantities of vanadium.

Dr. Hewett's first estimate of the possibilities of this new deposit has been more than justified during the ensuing years. On the barren hillside which he first saw in 1906 is now a pit 1,000 feet long, 400 feet wide and 300 feet deep from which has been taken some \$80,000,000 worth of vanadium. This mine at Mina Ragra has been the principal source of the world's vanadium for twenty years.

Dr. Hewett's most interesting slides of this area as he saw it in 1906 and Mr. Warren Jones' exhibit of some fine specimens from this mine completed a most interesting and instructive evening.

Pauline Saylor  
Covina, Calif.

### Feather River Gem and Mineral Society

First meeting of the Feather River Gem and Mineral Society of Oroville, California, was held January 27, 1948, and a very interesting talk was given by Mr. Charles A. Bush, organizing chairman. There was a registration of 26 members.

On February 12, the name and constitution of the club were officially adopted, and the Preamble follows:

In order to promote and improve the appreciation of rocks and minerals and preserve their beauty and scientific knowledge so that others may enjoy them and increase our knowledge of the mineral kingdom of nature, this society is organized as a non-profit social and cultural society.

Nomination of officers was held, and results are: President, Charles Bush; Vice-President, F. E. Rankin; Treasurer, Ray Palmer; Directors: W. S. Westwood, Lloyd Niemeyer, and Mrs. Alma Hogge.

Registration was increased by five new members.

Meetings are held at the Bird Street School on the 2nd and 4th Thursdays of each month. Visitors are welcome and correspondence is invited!

Adeline B. Rankin  
Secretary-Elect  
Route 1, Box 131A  
Oroville, California

#### Pomona Valley Mineral Club

The Pomona Valley Mineral Club had as its speaker for the March meeting Mrs. Florence Gordon, Vice-President of the Long Beach Mineral Society. She spoke on "The Story of Diamonds".

Mrs. Gordon started by telling the qualifications of a stone to make it precious. These are hardness, rareness, and beauty. Describing how a diamond is formed, she said that carbon must be trapped in lava under pressure, and where these and other conditions do not exist, no diamonds are formed. Man has tried his hand at making diamonds, and though he has succeeded in duplicating most stones, very few experiments have been successful in making diamonds. Those which were formed were of such minute size they have been of no use. Some diamonds are fluorescent and some phosphorescent. Scientists have recently discovered that diamonds can be fingerprinted, by microphotographing the crystal structure within the cut stone.

Mrs. Gordon stated that diamonds were first found in India between 800 and 600 B.C., and the earliest use of them as ornamental stones was in a Greek statue of about the 5th Century B.C. In the olden times, only the four upper faces of the diamonds were cut. The rest of the stone was embedded in the material in which it was set.

Although at one time, very wealthy men were the only ones to wear diamonds, giving it the name of the Kings Stone, women now wear most of them. Agnes Sorrell was the first woman to wear diamonds, borrowing some to wear to a court party. This occurred during the reign of Charles VII of France. Diamonds were first found in India, next in Brazil, and were discovered in Africa in 1867. They have been found in the United States in Arkansas, Wisconsin, Michigan, California, and many of the other states.

Seventy-eight per cent of all diamonds are industrial stones, used to turn machine parts, make grinding wheels, and draw wire. The latest use of them is as an abrasive on fingernail files.

Mrs. Gordon concluded with a brief history of some of the famous large stones, such as the Cullinan, Kohinoor, Hope, and Shah. Her subject was a fascinating one, and the Pomona Valley Club is indebted to Mrs. Gordon for her very interesting and informative talk.

G. W. Weist  
Publicity Chairman

#### New York Mineralogical Club

Columbia University (Schermerhorn Building, New York City, Wednesday, February 18, 1948)

The meeting was called to order at 8:00 P. M.

The treasurer, Dr. Kindle, gave his annual report and Mr. Sampier and Mr. Taylor were appointed as auditors.

Mr. Taylor called attention to the fact that the interest from the Kunz trust fund now amounts to over \$100 and that it should be used for some educational purpose.

Mr. Yedlin, chairman of the field trip committee, suggested that if any members knew of any new mineral localities in the vicinity of New York City, they get in touch with him.

Dr. Horace Winchell spoke on "Geological Excursions in Hawaii National Park". Dr. Winchell served several years as geologist for the Honolulu City Board of Water Supply and during that time, he had the opportunity to visit and study several of the islands in the Hawaiian chain. The Hawaiian Islands are volcanic in origin and have been built up from the sea floor, which is from 14,000 feet to 18,000 feet below sea level, up to a height of nearly 14,000 feet above sea level.

Although the islands are all volcanic, the topography varies considerably since the type of eruption determines the type of volcanic cone that results. If the eruption is explosive and the material ejected is mostly fragmental, a steep sided cinder cone will be formed but if the eruption is quiet and the ejected material is lava then a more gentle slope will result.

On the island of Oahu the prominent Diamond Head is an eroded tuff cone whereas on the Island of Hawaii the three largest volcanic cones are composed almost entirely of lava. Mauna Loa, although it is the highest cone, has very moderate slopes. Eruptions are through a fissure and spectacular lava fountains up to 600 feet high have been seen. The temperature of the lava has been determined to be about 800° C. The lava of Mauna Kea is slightly andesitic and more viscous and as a result the volcanic cone has steeper sides. The slopes of Mauna Kea is also dotted with numerous cinder cones while there are none on Mauna Loa.

The talk was very well illustrated with Kodachrome slides.

The meeting was adjourned at 9:30.

Purfield Kent  
Secretary

### Georgia Mineral Society (Atlanta, Ga.)

#### First Meeting Gemological Section

The first meeting of the Gemological Section was held Monday evening Feb. 23, 1948, and got off to a fine start under the able leadership of Mr. E. E. Joachim, Chairman.

The object of the section is to foster and encourage the study and appreciation of gems and gem material in all phases, specifically including;

- A. Study and identification of gem stones.
- B. Study of lapidary work.
- C. Promotion of gem collecting.
- D. Encouragement of the exchange of gems and gem materials.

Several outstanding collections of cut and polished gems were on exhibit and upwards of four hundred gems representing most all varieties were shown, including some rare and valuable specimens.

#### Field Trip Feb. 28, 1948, Troupe County

A field trip to the famous collecting area of Troupe County near LaGrange, Georgia, was held on Saturday Feb. 28, 1948. The trip was led by Dr. A. S. Furcron, President of the Society, and Mr. Sam Caudle of LaGrange, Ga. Mr. Caudle was a most gracious host and neglected his business to conduct the party over the county to the best collecting areas.

Troupe County is famous for its variety of quartz and both rose and crystal was collected. Among other minerals collected were beryl, tourmaline (black), chromite and garnierites.

Sixteen members were present, the inclement weather of the day before and threatening weather at leaving time held the attendance down. Members may well heed the words of Dr. Furcron—quote "It never rains on a Georgia Mineral Society Field Trip." unquote. The last two trips have certainly proved him right.

#### March Meeting, March 1, 1948

On Monday evening March 1, 1948, the Society met in the Civil Engineering Bldg. of the Georgia School of Technology. Dr. Horace G. Richards, Associate Curator of Geology and Paleontology of the Academy of Natural Sciences of Philadelphia, spoke on "The Colorado Delta", illustrating his talk with Kodachrome slides. Dr. Richards outlined the History of the Colorado River from 1907 to the present with emphasis on the international complications arising from the diversion of the waters from their natural course without respect to the geology of the area. Those who heard Dr. Richards at this meeting will certainly not miss hearing him again if he is available.

Four new members were taken into the Society including one out of state, Mr. Charles Hunter of North Carolina. This correspondent would like to say welcome to the Society.

S. C. Knox  
Corresponding Sec.

### Tucson Gem and Mineral Society

This has been a most active and busy season for the Tucson Gem & Mineral Society, and since we have members in our club from about every state in the Union, we feel the great rockhound fraternity would be interested in a report, especially since we have had some very outstanding events to report about.

At the meeting March 6, 1948, Mr. George R. Fansett spoke on "Some Field tests for Common Minerals" which is also the title of a bulletin issued by the University of Arizona, which he wrote. He gave us practical demonstrations in making these tests and as a result members are now prepared to do their own testing and analyzing. Mr. Fansett also demonstrated the Geiger counter, which many of us had never seen, using carnotite and pitchblende as the radio-active minerals.

However, the most outstanding event of the season was a public exhibition of over 800 specimens of the Oracle School Rock Club, of Oracle, Arizona. We were honored by having the father of the School rock club idea in Arizona, Mr. Arthur L. Flagg, of Phoenix, as our main speaker. Over a thousand people viewed this collection, including about seven hundred school children. Specimens from this collection won first prize at the Arizona State Fair, and was awarded a plaque by the Phelps Dodge Corporation in competition with 31 other school rock clubs of the state. Much interest was shown by school teachers and we hope more school mineral clubs may come into being from this effort.

Another achievement of the club this season was to place a large display case of fine specimens in the Tucson Public library, which is attracting much attention.

About 25 members went on a field trip to the San Pedro River near Mamouth, finding some good blue agate, a few obsidian boulders, and jasper. On Sunday, March 14, seven can took an all-day trip to Washington camp area, near the Mexican border. Over thirty people went along and reported a good time. As usual it took a rock-hen to find the prize specimens. Our Secretary, Mrs. "Murchy", found a fine quartz crystal group specimen studded with iron pyrite cubes.

James R. Watwood, President  
Tucson Gem & Mineral Society  
1225 N. Anita St., Tucson, Ariz.

### Texas Mineral Society

At the regular, February, monthly meeting of the Texas Mineral Society in the Baker Hotel in Dallas, Texas, Mr. William Weber of the Geological Department of Southern Methodist University showed colored slides of the Harvard University mineral collection. Mr. Weber also lectured with the slides on color photography of rocks.

Ralph D. Churchill, Secretary  
2003 Republic Bank Building  
Dallas 1, Texas

### Cincinnati Mineral Society

The February meeting of the Society was held Tues., Feb. 24, 1948, at its regular meeting place, the Cincinnati Museum of Natural History, Cincinnati, Ohio.

The meeting got under way at 8:00 P.M., presided over by Mr. Sarles, our president, with 17 regular members in attendance. Also present were Mr. Willde, guest of Mr. and Mrs. Warren Wells, and Mr. Tressle, guest of Miss Dehoney.

The topic of vital interest under "old business" was the discussion of methods and plans for completing details for the mineral display in a downtown bank window. Miss Dehoney and Mr. C. L. Gschwind were appointed a committee to carry to completion the work of organizing material to be shown and be responsible for the entire display. Mr. Ralph Dury extended the services of the Museum in the matter of labels and suitable mounting equipment. Mr. Frank Atkins, Jr. was appointed by the Committee to assist in the display. The display, which will have for its theme "Know your local minerals", will be shown the week of March 20 thru 27, in the window of the Fifth-Third Bank in downtown Cincinnati.

The lecture and discussion portion of the evening was conducted by Mr. Ralph Dury, Curator of the Cincinnati Museum of Natural History. Mr. Dury had apparently spent hours in the preparation of his subject, "Fluorescent Minerals", which was greatly enjoyed by all. There were several hundred mineral specimens on display ranging from lowly gravel pit conglomerate to precious and semi-precious gems—all of them were selected from the Museum's collection. In addition there were a number of common objects as liquids, paints, woods, plastics, and glassware. Mr. Dury used three different lamps of the long wave type and the short wave Mineralight; also a radar lamp and the old stand-by, Purple X. Comparison of the reactions of specimens such as the English and Rosiclar fluorites, and the calcite, willemite and calcium-larsenite of Franklin, N. J., under the various lamps, was most interesting. Specimens brought in by members were checked and discussed.

The next meeting of the Society will be held on March 31, 1948, at 8:00 P.M. at the Museum.

Charles L. Gschwind,  
Corresponding Secretary

### Los Angeles Lapidary Society

Gladys Babson Hannaford representative of N. W. Ayer & Son, N. Y., told the Los Angeles Lapidary Society about the diamond and the diamond industry at the last meeting. Her collection of replicas of the famous diamonds of the world both cut and as they were found in the rough created much interest. Slides of diamond mining procedures and locations in

South Africa and of cut and mounted gemstones rounded out her thoroughly enjoyed lecture.

Recently the L. S. L. S. has been host to a number of local dealers and we hope to welcome more. Mr. Gordon of Long Beach gave a talk on equipment. Mr. and Mrs. Rogers and Mr. Boblet of the R and B Artcraft, Messrs. Clarkes and Kuhn of the S and T Gem and Mineral Shop, and Mr. and Mrs. Geo. Curtis of Hermosa Beach have all attended and been introduced. Members of L. A. L. S. were glad to welcome Mr. and Mrs. Clemente Urrutia to our last meeting. Clemente, known to most of all the local rockhounds as the jeweler, "par excellence" is at present teaching jewelry to a large number of the members of the Society.

Twelve members filled the display table with gemstones of unusual quality and beauty. An exhibit of stones dyed with aniline was particularly unique.

Through the generosity of Mr. Rolland E. Willis, the L. A. L. S. now has in its library a complete set of Kodachrome slides on "The Story of the Gems". These slides are available to any local gem or mineralogical society. Money received from these slides will be placed in the Permanent Fund of the Society.

**THE FACETEERS:**—Mr. Thomas Daniel has been elected the new Chairman of the Faceteers and Ted Bennett the new Secretary. At the last meeting Mr. Douglas McDonald gave some very interesting and useful information on the new synthetic Star Ruby, illustrating his talk with one of the new much talked of stones. The usual number of beautiful faceted stones were displayed and Mr. Ray Merz brought a diamond which he is cutting; his third!! The ladies are doing excellent cutting too. Rose Clement, Goldie Wood, Maude Robinson have all brought in beautifully faceted stones.

Please note correction in P. O. Box: The mailing address of the L. A. L. S. is P. O. Box 2184 Terminal Annex, Los Angeles 54.

Pub. Chairman  
Willella Gunderson

### Oklahoma Mineral and Gem Society

The following is a digest of the February meeting of the Oklahoma Mineral and Gem Society.

An address was given by the Charter President, Mr. J. B. Lankford, on the history preceding the organization and drafting of the charter.

The address of the evening was presented by Mr. Geo. E. Smith, past president. Mr. Smith's topic for the evening was "Minerals Of The Southeastern United States". Preceding the talk on the mineral possibilities of the region, was a brief geologic history of the development of the region which explains why the localities are so lucrative with mineral specimens. The subject was covered in a very



comprehensive manner and excellently illustrated with maps and mineral specimens.

The Oklahoma Mineral and Gem Society meets the first Thursday of each month at an announced location. All visitors and interested persons are cordially invited.

Hubert M. Rackets,  
Publicity

### San Diego Mineral and Gem Society

SAN DIEGO MINERAL & GEM SOCIETY officially became the NEW name of the former San Diego Mineralogical Society at the 13 February meeting. The name, designed to recognize the growing interest in lapidary work within the Society, had been approved by the Board of Directors, and the recommendation upon being presented to Society members, passed without a single dissenting vote.

The evening's topic, presented by Mr. Homer Dana, centered on the difficulties encountered in the sculpturing of "Thunder", said to be the largest jade sculpture ever made; Mr. Dana is assistant to Donal Hord, creator of the sculpture. After his talk, the audience plied the speaker with many questions, and then crowded around to view photographs depicting various stages in the creation of the sculpture.

Hord and Dana worked 6 hours a day, 5 days a week for a year to complete "Thunder", an American Indian. First exhibited in La Jolla, the statue has been offered for sale at \$25,000. The completed statue, 20 inches high, 16 inches wide, and weighing 104 pounds, was made from a piece of spinach-green Wyoming jade which weighed 460 pounds.

### Pacific Society Enjoys Lecture and Pictures on Butte, Montana

Members and guests of the Pacific Mineral Society enjoyed a lecture and colored films by President, James Underwood, on "The Copper Mines at Butte, Mont." It is believed that these deposits were of the Eocene or Cretaceous periods. Butte, Mont., has been nicknamed "The Richest Hill in the World". In 1930, their mine reports showed an output of 1,240,000 tons of Copper, 10,000,000 ounces of Silver, and considerable Gold. It was estimated that they produced \$4,000,000,000 worth of material in 1947. This deposit had a core of zinc-free copper and around that was copper and zinc combined, outside of this on the north, south and west sides were zinc mines, and beyond this was predominately pyrite. There are over 3000 miles of tunnels at Butte and are so extensive, that it requires 45 minutes for the men to change shifts on a lift that travels 2400 ft. per minute. The men are required to wear woolen clothes as the acids eat the cotton ones and the acid also eats the picks and shovels in a very short time.

They use scrap iron in their precipitation tanks at the rate of 1 to 1½ tons of iron to reclaim 1 ton of copper from the copper-bearing solutions. Specimens on display from this area were Enargite, Sphalerite, Chalcopryite, Covellite, Pyrite and Quartz, Chalcocite, and a specimen of Pyrite and Enargite which was taken out of the mine 35 years ago. Also pictures of the Anaconda Smelter were shown. The Anaconda has the tallest chimney in the world and is 585 ft. high, 75 ft. in diameter at the base with 60 ft. diameter at the top and its walls are 15 ft. thick. This smelter had a roasting oven 36 ft. in diameter with rotating rakes. Some of O. C. Smith's films on the Society's previous field trips were also shown. Dr. Foster displayed an exhibit of minerals found at Darwin, Calif.

Field trip for February under J. A. Jones, was to the Riverside City Quarry where they found Garnet, Blue Calcite, Wollastonite, Aragonite and Vonsenite, also some Epidote crystals were found.

Mrs. A. E. Allard, Pub. Chm.  
3133 Live Oak Street,  
Huntington Park, Calif.

### Dona Ana County Rockhound Club (New Mexico)

This is the official name of the new organization of whose formation you were advised in a previous communication. This name was adopted at the second regular meeting of the club, held Friday evening, Feb. 13, 1948, at which time there were also adopted "Articles of organization". Thus the club is now a full-fledged outfit rather than a struggling fledgling.

We gained five new members at this, our second meeting, making a total of fifteen. We are a small club—as you can see—but we expect to grow. Our purpose is not only social but also serious, witness the purpose as stated in our articles of organization: "...To facilitate the collection, identification, study, and processing of rocks and minerals, the collection, processing, and study of artifacts, and the study of the history, archaeology, and geology of southern New Mexico."

(We may, of course, step over the border of either Dona Ana County or the State of New Mexico from time to time.)

At our first meeting we listened to an interesting and instructive paper on crystals, ably presented by our President, Mrs. S. F. Sanders. At our second meeting Edward Archer and Ruth A. Perkins spoke on "Hardness of Minerals" and "Gems", respectively. Committees were appointed for the arrangement and management of field trips (which will start soon) and some preliminary discussion was held regarding a "formal" installation of officers to be held in the near future. The host and hostess, Mr. and Mrs. Edward Archer, arranged a display of mineral specimens and artifacts



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